USDA United States Department of Agriculture

Forest Service

May 2009

Environmental Assessment

Greasy Creek

Ocoee/Hiwassee Ranger District, Cherokee National Forest
Polk County, Tennessee

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INTRODUCTION

Document Structure

The Forest Service, U.S. Department of Agriculture has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

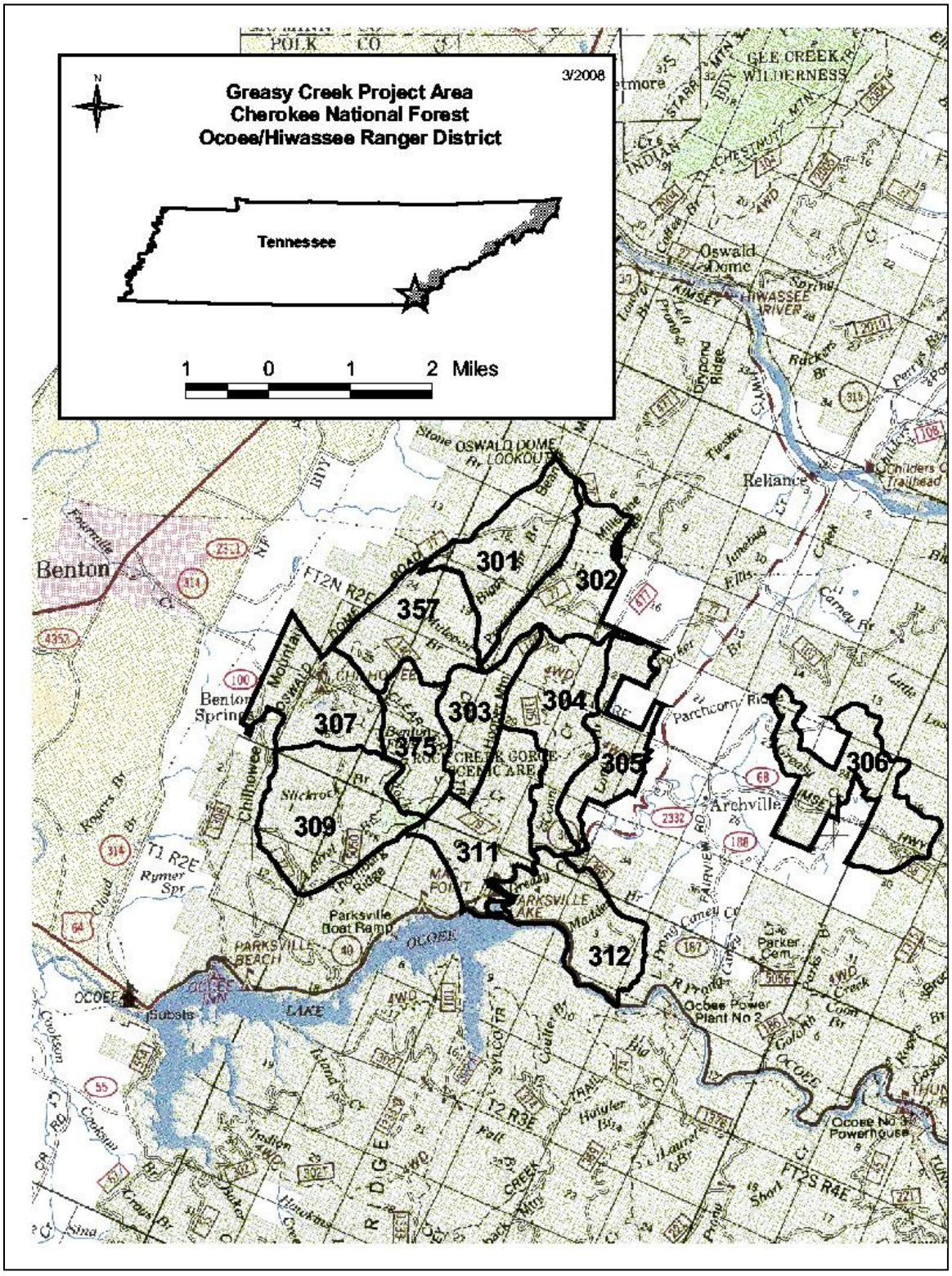
- *Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Agencies and Persons Consulted:* This section provides a list of prepares and agencies consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Tellico Ranger District office in Tellico Plains, Tennessee.

Background

The project area is comprised of compartments 301, 302, 303, 304, 305, 306, 307, 309, 311, 312, 357, and 375 and covers approximately 12,910 acres. The project area is located just to the north of Parksville Lake and east of Benton, Tennessee (Figure 1).

Figure 1. Vicinity Map



Purpose and Need for Action

The Cherokee National Forest Revised Land and Resource Management Plan (RLRMP), approved in 2004, made broad decisions regarding allocation of land and measures necessary to manage National Forest resources. The RLRMP establishes direction for the multiple use management and sustained yield of goods and services for all National Forest System (NFS) lands within the Cherokee National Forest (CNF) boundaries. It describes how different areas of land should look and what resources could be provided from these lands now and in the future (desired future condition).

The RLRMP further allocates land into Management Prescriptions (MPs). A MP is a selected grouping of National Forest lands with similar land and resource characteristics and similar management goals. MPs provide a more specific set of goals and objectives, which help lead to the forests overall desired future condition (DFC).

The 12 compartments that comprise the Greasy Creek project area are predominantly assigned to MP 9.H (61%). The remainder of the project area is allocated to the following MPs: 4.F Scenic Areas(less than 1%), 5.A Administrative Sites (less then 1%), 5.B Designated Communication Electronic Sites (less than 1%), 7.A Scenic Byway Corridors (12%), 7.B Scenic Corridors/Sensitive Viewsheds (3%), 7.D Concentrated Recreation Zones (2%), and 11 Riparian Corridors (21%). These are estimations only, especially of the Riparian Prescription.

The RLRMP, pages 156 to 158 describe the DFC and standards for management activities/practices that will lead to the desired future condition of the management prescription 9.H. Where MP 9.H is silent on specific goals, objectives and standards the forest wide goals, objectives and standards (pgs. 21-72) should be applied.

Management Prescription 9.H emphasizes managing, maintaining, and restoring forest communities to those plant communities predicted as most likely to occur in each ecological unit based upon their ecological potential. This may be accomplished through silvicultural activities such as prescribed burning; mechanical and chemical vegetation control; uneven-aged, two-aged, and even-aged silvicultural methods. This prescription is aimed at managing and restoring landscape vegetative community patterns to their ecological potential while providing suitable to optimal habitats to support populations of the plant and animal species associated with these communities, resulting in a very high likelihood that all native species within these associations continue to persist on NFS lands. Sources of information on ecological potential for the CNF include but are not limited to numerous historic records of forest inventories completed in the southern Appalachians; ecosystem level analysis, ecological classification system, USDA Land Acquisition Files for the CNF; and the International Classification of Ecological Communities, Terrestrial Vegetation of the Southeastern United States, CNF Classification Subset.

The desired future condition in MP 9.H includes an intermediate mix of forest successional stages. Mid- and late-successional forests are common, but 4 to 10 percent of forested land is in early-successional forest conditions. Early-successional forest patches vary in size, but many are larger than 20 acres to provide optimal conditions for dependent species. Where compatible with other multiple-use objectives, early-successional forest created by management actions are clustered on the landscape to maintain blocks of mid- and late- successional forest. Existing old fields and openings for wildlife may be present and maintained. Expansion of existing openings and/or creation of new openings may occur. Non-invasive non-natives are sometimes used when establishing food plants for wildlife, but native species are used where feasible and cost

effective. Some openings provide permanent shrub/sapling habitats as a result of longer maintenance cycle.

Goals, objectives, and standards were developed for the forest and each MP to permit management activities that would lead an area toward its desired future condition. Thus comparison of these goals, objectives, and standards with the existing conditions identifies those areas where efforts should be focused and management activities should take place. The following are the goals and objectives that the Greasy Creek proposal is designed to address:

Goal 1 Watersheds are managed (and where necessary restored) to provide resilient and stable conditions to support the quality and quantity of water necessary to protect ecological functions and support intended beneficial water uses.

Goal 3 Maintain or improve watershed condition and stream channel conditions to limit the amount of sediment to levels that will not adversely affect channel capacity, beneficial uses of water and regulatory designations (ORNW/Wild and Scenic etc.)

Goal 10 Maintain and restore natural communities in amounts, arrangements, and conditions capable of supporting viable populations of existing native and desired non-native plants, fish, and wildlife species within the planning area.

Goal 14 Contribute to conservation and recovery of federally listed threatened and endangered species and avoid actions that would lead to federal listing of other species under the Endangered Species Act.

> Objective 14.02 Provide upland water sources approximately every 0.5 miles, to provide an important habitat element for wildlife, including the endangered Indiana bat. Water sources are comprised of both permanent ponds and ephemeral pools and are often located in openings or near road corridors that allow access by bats.

Goal 15 Minimize adverse effects of invasive non-native species. Control such species where feasible and necessary to protect national forest resources.

> Objective 15.02 Control non-native and unwanted native species, where they threaten TES [threatened, endangered and sensitive species] elements, ecological integrity of communities, or habitat created for demand species.

Goal 17 Restore and maintain forest communities to those plant communities predicted as most likely to occur based on the ecological potential of the site potential natural vegetation.

> Objective 17.02 Over the ten-year period restore oak or oak/pine forests on at least 9,000 acres of appropriate sites currently occupied by pine plantations or other sites with minimal diversity.
>
> Objective 17.03 Over the ten-year period, restore at least 10,000 acres of shortleaf/pitch/table-mountain pine forests.
>
> Objective 17.05 Over the ten-year period reduce the acreage of Virginia pine forest by at least 25,000 acres, through restoration of fire-adapted pine or oak communities.

Goal 18 Contribute to maintenance or restoration of native tree species whose role in forest ecosystems is threatened by insects and disease. Management activities will reduce the impacts from non-native invasive species.

Objective 18.02 Promote the health of susceptible forest communities by maintaining a site-specific basal area that promotes tree vigor. Encourage advanced regeneration of oak species.

Goal 19 Where forest management activities are needed and appropriate to achieve the desired composition, structure, function, productivity, public health and safety, and sustainability of forest ecosystems; a result of such activities will also be to provide wood products for local needs.

Objective 19.01 Provide 33,726 MCF of sawtimber per decade.

Objective 19.02 Provide 6,242 MCF of pulpwood per decade.

Goal 21 Use fire during dormant and growing seasons to achieve ecological sustainability, rehabilitation, and restoration of fire dependant and associated communities. Identify and establish appropriate "burning blocks" that facilitate the use of prescribed fire to maintain and restore fire dependant and associated communities.

Objective 21.01 Prescribe burn an average of at least 1,100 acres per year of shortleaf/pitch/table mountain pine forest in an effort to maintain a fire return cycle of 4-12 years.

Objective 21.02 Prescribe burn an average of at least 5,200 acres per year of oak and oak/pine forest in an effort to maintain a fire return cycle of 4-12 years.

Objective 21.04 Prescribe burn an average of at least 1,200 acres per year of pine/oak forest in an effort to maintain a fire return cycle of 4-12 years.

Goal 23 Fire dependent ecosystem components are maintained by desired fire regimes. Restore and maintain fire associated and dependent landscapes by moving them from condition class 2 and 3 to condition class 1.

Goal 24 Reduce hazardous fuels through wildland fire use, prescribed fire and mechanical fuels treatment.

Objective 24.01 Reduce hazardous fuels between 19,000 and 60,000 acres per year with priority given to areas affected by insects, diseases, storm damage and along NFS boundaries with high values at risk.

Objective 24.02 Minimize the acreage of mixed mesophytic and northern hardwood forest prescribe burned annually, within the constraints of meeting other prescribed fire objectives and without resulting in large increases in plowed or bladed fireline construction..

Goal 47 Construct, reconstruct and maintain roads to reduce sediment delivery to water bodies.

Goal 48 Provide a transportation system that supplies safe and efficient access for forest users while protecting forest resources. Emphasize acquisition of rights-of-way or fee simple titles as appropriate to facilitate maintenance and meet access needs.

Goal 50 Identify and upgrade highly used forest roads needed for public access and other roads that are needed but are adversely affecting surrounding resource values and conditions.

Objective 9.H-1.01 Manage forest successional stages to maintain a minimum of 50 percent of forested acres in mid- to late-successional forest, including old growth; a minimum of 20 percent of forested acres in late-successional forest including old growth; and 4 to 10 percent in early-successional forest.

Objective MA4-1.01 In the lower Ocoee River watershed, priority Forest Service roads to maintain and improve to reduce the movement of accelerated sediment from roads to tributary steams of the Ocoee River include 185 and 77.

Table 1 displays the differences between the DFC and the existing condition of the project area in relation to Objective 9.H 1.01. There are 8,222 acres of MP 9.H in the Greasy Creek project area. As indicated in the table there is currently a lack of early successional habitat. There are also opportunities not listed in the table for the accomplishment of other RLRMP objectives. The difference between DFC and existing conditions provide opportunities for management activities that can lead this area toward the DFC. Need to add sentence on decreased project area.

Table 1. Comparison of Selected Objectives by Condition

Objectives/Standard	Desired	Existing	Proposed Action
Maintain a minimum of 50% of forested acres in mid to late successional forest including old growth	4,111+ acres	5,929 ac (72%)	5,539 ac (67%)
Maintain a minimum of 20% of forested acres in late successional forest including old growth	1,644+ acres	3,517 ac (43%)	3,263 ac (40%)
Maintain 4% to 10% of forested acres in early successional forest	329-822 acres	277 ac (3%*) *Includes 76 ac existing 0-10 and 201 ac (2.5%) planned for SPB restoration.	667 ac (8%) Proposed action adds 390 ac (5%) to the existing early succession (277 ac, 3%) for the above figure.

Note: Total forested acres in MP 9H = 8,222 from FSVeg dated 11/2007

The following summarizes the purpose and need of the proposed action in this area.

- Restore natural oak and oak-pine communities through silvicultural treatments on approximately 83 acres of existing forested stands that have been altered from desired conditions due to previous land use.
- Restore shortleaf pine and shortleaf pine-oak communities through silvicultural treatments on approximately 307 acres of existing forested stands that have been altered from desired conditions due to previous land use.
- Restore native pine-oak communities through site preparation burn on 39 acres that have been impacted by Southern Pine Beetle (SPB).
- Use chemical methods to establish desired vegetation on approximately 10.5 miles of Tennessee Valley Authority (TVA) transmission line. Some of this area may also be planted in a mixture of either cool season seeds or native seeds.
- Maintain approximately 43 acres of existing spot and linear wildlife openings.
- Seed areas of timber harvest that are site prep burned with a non invasive grass seed mixture following burn.
- Create ephemeral pools for amphibians and bats in temporary roads and log landings.
- Complete fuels reduction burns on approximately 4,250 acres.
- Reconstruct 3.3 miles of existing system roads.
- Construct 2.1 miles of temporary roads.

- Relocate and construct 1.7 miles of National Forest System Road (NFSR) 185. Obliterate the old road bed and return to riparian habitat.
- Construct .7 mile of system road.
- Perform maintenance on 18.5 miles of NFSRs needed for timber haul.

Proposed Action

The Ocoee/Hiwassee Ranger District is proposing the following actions to achieve the purpose and need (See Appendix A for maps).

Silvicultural Treatments – *Proposed Activities*

1) Restore natural oak and oak-pine communities and create early successional habitat through silvicultural treatments on approximately 83 acres of existing forested stands that have been altered from desired conditions due to previous land use. Restore these stands to forested communities that would naturally occur on these sites. These stands are mostly upland sites that would support "dry to mesic oak forest" or "dry and dry mesic oak-pine forests". These stands currently support a high component of Virginia pine, white pine or both of these species. Regeneration sources would be existing seedlings, coppice or stump sprouts. Herbicide application (triclopyr) would be applied in these stands the second year after planting. Activities would occur in the stands listed in Table 2.

Table 2. Restoration of Oak and Oak-Pine Communities

Compartment/ Stand	Acreage	Type of Harvest	Reforestation	Scenic Integrity Objective/ Viewing Platform
303/05	40	Shelterwood w/reserves	Natural regeneration by seeding and sprouting. Manual site preparation with 2nd year chemical release.	Low/ Moderate Clear Creek NFSR 185
357/40	27	Shelterwood w/reserves	Natural regeneration by seeding and sprouting. Manual site preparation with burning, 2nd year chemical release.	Moderate Oswald Dome NFSR 77
357/41	16	Shelterwood w/reserves	Natural regeneration by seeding and sprouting. Manual site preparation with burning, 2nd year chemical release.	Low
TOTAL	83			

2) Restore shortleaf pine and shortleaf pine-oak communities and create early successional habitat through silvicultural treatments on approximately 307 acres of existing forested stands that have been altered from desired conditions due to previous land use. These are mostly ridge sites that would support "xeric pine and pine-oak forests" within which fire has historically played an important role in shaping species composition. These stands currently support a high component of Virginia pine, white pine or both of these species. Site preparation, planting of shortleaf pine, and a second year chemical release using herbicide (triclopyr) would ensure the

survival and establishment of desired oak and pine. Activities would occur in the following stands shown in Table 3.

Table 3. Restoration of Shortleaf Pine and Shortleaf Pine-Oak Communities

Compartment/ Stand	Acreage	Type of Harvest	Reforestation	Scenic Integrity Objective/ Viewing Platform
301/24	20	Seedtree w/reserves	Manual site preparation with burning, plant shortleaf pine, 2nd year chemical release	Low/ Moderate Oswald Dome NFSR 77
301/27	17	Seedtree w/reserves	Manual site preparation with burning, plant shortleaf pine, 2nd year chemical release	Low/ Moderate Oswald Dome NFSR 77
302/21	20	Clearcut w/reserves	Manual site preparation with burning, plant shortleaf pine, 2nd year chemical release	Low/ Moderate Oswald Dome NFSR 77 and Clear Creek NFSR 185
304/24	40	Seedtree w/reserves	Manual site preparation with burning, plant shortleaf pine, 2nd year chemical release	Low
304/25	28	Seedtree w/reserves	Manual site preparation with burning, plant shortleaf pine, 2nd year chemical release	Low
305/04	25	Seedtree w/reserves	Manual site preparation with burning, plant shortleaf pine, 2nd year chemical release	Low
306/03	17	Seedtree w/reserves	Manual site preparation with burning, plant shortleaf pine, 2nd year chemical release	Low
306/32	40	Seedtree w/reserves	Manual site preparation with burning, spot plant shortleaf pine, 2nd year chemical release	Low
306/35	18	Seedtree w/reserves	Manual site preparation with burning, plant shortleaf pine, 2nd year chemical release	Low
306/38	37	Seedtree w/reserves	Manual site preparation with burning, plant shortleaf pine, 2nd year chemical release	Low
375/08	35	Seedtree w/reserves	Manual site preparation with burning, plant shortleaf pine, 2nd year chemical release	Moderate Clear Creek Trail #79 (0.75 mile) Rim Rock Trail # 77 (0.57 mile)
375/22	10	Seedtree w/reserves	Manual site preparation with burning, plant shortleaf pine, 2nd year chemical release	Low
TOTAL	307			

3) Restore native pine-oak communities that have been impacted by SPB mortality. This upland pine-oak stand would be prescribe burned for site preparation and allowed to regenerate naturally from seeding and sprouting on 39 acres shown in Table 4.

Table 4. Restoration by Site Preparation Burn

Compartment/Stand	Acres	Reforestation
357/16	39	Site preparation burn, natural regeneration

Design criteria were developed to ensure compatibility of Silvicultural Treatment activities with Scenery Integrity Objectives (SIO) and RLRMP standards FW-112 and FW-113. The intent of design criteria is to reduce elements visually recognized as detracting from scenic quality, and/or decreasing scenic integrity levels, while promoting elements known to enhance and/or maintain scenic integrity. Design criteria which minimize noticeable contrasts in the desired natural appearing landscape are the following:

- Utilize sensitive road and landing design. Where possible locate log landings, roads, and bladed skid trails out of view to avoid bare mineral soil observation from noted viewing platforms. If cut and fill slopes are created, re-vegetate to the extent possible.
- Shape and orient openings with contours and existing vegetation patterns to blend with existing landscape. Edges are shaped and feathered where appropriate and feasible. Avoid geometric shapes and appearance of straight lines.
- Root wads, slash, and other debris are chipped, lopped, or burned to an average of four feet of the ground when visible within 100' on either side of noted travel ways.
- Limit openings visible from noted travel routes
- Retain areas, as site condition allow, within the immediate foreground (300 feet from road) with a basal area up to 35 square feet to reduce visual impact of a large opening in the foreground.
- Retaining large diameter trees with well defined crowns along the road to frame new views created by a harvest unit does contribute to retaining SIO.
- Apply leave tree unit marking to limit visibility within 100' of noted travel routes.

The activities described above would contribute to meeting the following RLRMP objectives:

Objective 17.02 Over the ten-year period restore oak or oak/pine forests on at least 9,000 acres of appropriate sites currently occupied by pine plantations or other sites with minimal diversity.

Objective 17.03 Over the ten-year period, restore at least 10,000 acres of shortleaf/pitch/table-mountain pine forests.

Objective 17.05 Over the ten-year period reduce the acreage of Virginia pine forest by at least 25,000 acres, through restoration of fire-adapted pine or oak communities.

Objective 18.02 Promote the health of susceptible forest communities by maintaining a site-specific basal area that promotes tree vigor. Encourage advanced regeneration of oak species.

Objective 19.01 Provide 33,726 MCF of sawtimber per decade.

Objective 19.02 Provide 6,242 MCF of pulpwood per decade.

Objective 9.H-1.01 Manage forest successional stages to maintain a minimum of 50 percent of forested acres in mid- to late-successional forest, including old growth; a minimum of 20 percent of forested acres in late-successional forest including old growth; and 4 to 10 percent in early-successional forest.

Terrestrial Wildlife Habitat Improvements – *Proposed Activities*

1) Chemical methods would be used to establish desired vegetation on approximately 10.5 miles of TVA transmission line. This is total mileage of line; the actual area treated with herbicide would generally be much less than the total acreage. About 8 miles of the line is outside of the original Greasy Creek Ecosystem Assessment Area.

The transmission line easement would be treated with an appropriate rate of herbicide to promote native grasses and forbs. Techniques that could be used include direct foliar applications using systems mounted on trucks, tractors or all-terrain vehicles, backpack sprayers, hand-held brushes or, basal bark and stem treatments using spraying or painting (wiping) methods, cut surface treatments (spraying or wiping), and woody stem injections. Herbicides to be considered are: Clopyralid, Dicamba, Glyphosate, Hexazinone, Imazapic, Imazapyr, Metsulfuron methyl, and Triclopyr. It is anticipated that most sites would require multiple treatments over several years to gain the desired level of control and establish native grasses and forbs. Monitoring would be a necessary component in determining the frequency and type of successive treatments.

Some areas may be planted following herbicide application. At that time, one of two seed mixtures would be used 1) a cool season mixture including rye grass and clover or 2) a native mixture including Indian grass, little bluestem, switchgrass, Illinois bundle flower, partridge pea, and big bluestem. Mixture selection would be based on site characteristics. Mechanical and chemical methods would also be used to maintain the preferred vegetation by selectively treating the woody sprouts that develop after planting.

2) Create ephemeral pools for amphibians and bats in temporary roads and log landings (approximately 10-30 pools up to .25 acre each).

3) Maintain approximately 43 acres of existing spot and linear wildlife openings. Maintenance activities typically include, but are not limited to, mowing, fertilizing, sowing, and rehabilitation.

Table 5. Linear wildlife openings for maintenance

NFSR	Opening number	Acres	Miles	NFSR	Opening number	Acres	Miles
33041	304-1	8	4.45	336A-D/33121	312-2	5	3.4
1305	305-1	2	1.43	33571A	357-1	2.8	1.55
33402	305-2	4	1.68	33571B	357-2	1.2	.77
1311	311-2	1.6	.58	33571C	357-3	.6	.27
5050	309.9	2.6	2.2				

Table 6. Spot wildlife openings for maintenance

Opening number	Acres	Opening number	Acres	Opening number	Acres
301-1	.6	309-2	1	309-7	.5
301-2	1	309-3	.8	309-8	.3
301-3	.8	309-4	1.4	311-1	.7
307-1	1.2	309-5	1.1	312-1	.9
309-1	2.3	309-6	1.3	357-4	1.5

4) Seed areas of timber harvest that are site prep burned with a non invasive grass seed mixture following burning.

The activities described above would contribute to meeting the following RLRMP objectives:

Objective 14.02 Provide upland water sources approximately every 0.5 miles, to provide an important habitat element for wildlife, including the endangered Indiana bat. Water sources are comprised of both permanent ponds and ephemeral pools and are often located in openings or near road corridors that allow access by bats.

Objective 15.02 Control non-native and unwanted native species, where they threaten TES [threatened, endangered and sensitive species] elements, ecological integrity of communities, or habitat created for demand species.

Fuels Management – *Proposed Activities*

1) Prescribe burn the units shown in Table 7 during dormant season to achieve fuel reduction, wildlife habitat improvement and vegetation management objectives. The prescribed burning would utilize roads, streams, and trails for fire lines when practical. Sections of constructed line (handline and dozer line) would be used sparingly, and only when there are no existing features to contain the prescribed burns. The units would not be burned during the same year and each unit may be burned twice over 5 years.

Table 7. Fuels Reduction Burns

Name of Burn	Burn Unit ID Number	Acres
Seed Orchard	O-32	450
Presswood Mountain	O-30	1,275
Madden Branch	O-36	1,120
Coon Creek (Hooper Mountain)	O-34	1,405
TOTAL		**4,250**

The activities described above would contribute to meeting the following RLRMP goals/objectives:

Objective 21.01 Prescribe burn an average of at least 1,100 acres per year of shortleaf/pitch/table mountain pine forest in an effort to maintain a fire return cycle of 4-12 years.

Objective 21.02 Prescribe burn an average of at least 5,200 acres per year of oak and oak/pine forest in an effort to maintain a fire return cycle of 4-12 years.

Objective 21.04 Prescribe burn an average of at least 1,200 acres per year of pine/oak forest in an effort to maintain a fire return cycle of 4-12 years.

Objective 24.01 Reduce hazardous fuels between 19,000 and 60,000 acres per year with priority given to areas affected by insects, diseases, storm damage and along NFS boundaries with high values at risk.

Objective 24.02 Minimize the acreage of mixed mesophytic and northern hardwood forest prescribe burned annually, within the constraints of meeting other prescribed fire objectives and without resulting in large increases in plowed or bladed fireline construction.

Goal 23 Fire dependent ecosystem components are maintained by desired fire regimes. Restore and maintain fire associated and dependent landscapes by moving them from condition class 2 and 3 to condition class 1.

Facilities, Roads and Access – *Proposed Activities*

1) Relocate and construct 1.7 miles of NFSR 185 for the purpose of moving the road out of riparian habitat and improving water quality in Clear Creek. The old road bed would be obliterated and returned to riparian habitat.

2) Reconstruct approximately 3.3 miles of existing NFSRs to bring them up to standards. Work would primarily consist of; widening curves, spot placing gravel, brushing, minor re-shaping, cleaning and constructing dips and other drainage structures to improve overall drainage, upgrading culverts, and replacing gates. See Transportation Analysis in project file for details by road.)

3) Construct approximately 2.1 miles of temporary roads to access harvest units. Temporary roads would be closed, stabilized and seeded with wildlife preferred species following completion of the project.

4) Perform maintenance on approximately 18.5 miles of NFSRs to prepare the roads for management activities. Maintenance activities include placing gravel and grading.

5) Construct approximately .7 mile of new NFSRs to access a unit to be treated by commercial timber sale. The road would be the minimum standard needed to remove timber and would be for administrative use only.

The activities described above would contribute to meeting the following RLRMP goals/objectives:

Goal 1 Watersheds are managed (and where necessary restored) to provide resilient and stable conditions to support the quality and quantity of water necessary to protect ecological functions and support intended beneficial water uses.

Goal 3 Maintain or improve watershed condition and stream channel conditions to limit the amount of sediment to levels that will not adversely affect channel capacity, beneficial uses of water and regulatory designations (ORNW/Wild and Scenic etc.)

Goal 47 Construct, reconstruct and maintain roads to reduce sediment delivery to water bodies.

Goal 48 Provide a transportation system that supplies safe and efficient access for forest users while protecting forest resources.

Goal 50 Identify and upgrade highly used forest roads needed for public access and other roads that are needed but are adversely affecting surrounding resource values and conditions.

Objective MA4-1.01 In the lower Ocoee River watershed, priority Forest Service roads to maintain and improve to reduce the movement of accelerated sediment from roads to tributary steams of the Ocoee River include 185 and 77.

Decision Framework

The decision to be made is whether or not to implement the proposed action, or another alternative in order to fulfill the purpose and need for the proposal.

Public Involvement

Scoping, to solicit the issues and concerns related to the proposed action started on August 15, 2007. Letters (see Project File) were mailed to approximately 46 interested and affected agencies, organizations, tribes, individuals and adjacent landowners. See the Consultation and Coordination section of this document for a listing of the interested and affected agencies, organizations, tribes, individuals and adjacent landowners contacted. These letters informed recipients of the proposed action and requested their input. Additional information was sent to those that requested it. The proposal was also listed in the Cherokee National Forest Schedule of Proposed Actions in July and October of 2007; January, April, July and October of 2008; and January 2009.

Using the comments from the public, other agencies, and tribes, the interdisciplinary team (IDT) developed a list of issues to address.

Issues

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

There were no significant issues raised by the team or the public for the Greasy Creek analysis area that would promote the need for a separate alternative. Therefore, only the No Action Alternative and the proposed action alternative will be analyzed.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the Greasy Creek project. It includes a description and map of each alternative considered in detail. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative and some of the information is based upon the environmental, social and economic effects of implementing each alternative.

Alternatives

Alternative A

No Action

Under the No Action Alternative, no changes to the existing environment would occur beyond those attributed to natural processes and disturbances. No project activities would be implemented. Routine activities such as road maintenance and wildlife opening maintenance would continue to occur.

Alternative B

The Proposed Action

Following is a summary of the proposal that was scoped to the public. A more detailed account of the proposed activities is presented in the previous chapter. In this alternative the Ocoee/Hiwassee Ranger District is proposing the following actions to achieve the purpose and need (See Appendix A for maps).

- Restore natural oak and oak-pine communities through silvicultural treatments on approximately 83 acres of existing forested stands that have been altered from desired conditions due to previous land use.
- Restore shortleaf pine and shortleaf pine-oak communities through silvicultural treatments on approximately 307 acres of existing forested stands that have been altered from desired conditions due to previous land use.
- Restore native pine-oak communities through site preparation burn on 39 acres that have been impacted by SPB.
- Use chemical methods to establish desired vegetation on approximately 10.5 miles of TVA transmission line. Some of this area may also be planted in a mixture of either cool season seeds or native seeds.
- Maintain approximately 43 acres of existing spot and linear wildlife openings.
- Seed areas of timber harvest that are site prep burned with a non invasive grass seed mixture following burn.
- Create ephemeral pools for amphibians and bats in temporary roads and log landings (approximately 10-30 pools).
- Complete fuels reduction burns on approximately 4,250 acres.
- Reconstruct 3.3 miles of existing system roads.

- Construct 2.1 miles of temporary roads.
- Relocate and construct 1.7 miles of National Forest System Road (NFSR) 185. Obliterate the old road bed and return to riparian habitat.
- Construct .7 mile of system road.
- Perform maintenance on 18.5 miles of NFSRs needed for timber haul.

Mitigation Common to All Alternatives

The RLRMP contains Forest Wide, Management Prescription specific, and Management Area specific standards that mitigate adverse effects to all resources. These standards are part of all action alternatives.

Additional mitigation measures were also developed to reduce impacts from the alternatives. The following mitigation measures are in addition to those required by the RLRMP.

If burning takes place during bald eagle nesting season (October 1 through June 15 or when monitoring determines eagles are nesting) prescribed burning will be conducted with the following mitigation:

- There will be no aerial ignition within the secondary zone. While the remainder of the burn may be conducted by aircraft, the flight path will not be within the secondary zone.
- Prior to and during ignition, the wind direction will be away from the nest location.
- The wind direction will be monitored during ignition.
- The eagles will be monitored during ignition to record their behavior.
- If the wind direction shifts towards the nest, burning will be completed in as timely a manner as possible observing all human safety precautions.
- No activities that modify the canopy would occur during nesting season (October 1 to June 15) within secondary zone.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in Table 8 is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. This information is estimated quantities based on best available data.

Table 8. Comparison of Alternatives

ACTIVITY	UNITS	ALT. A	ALT. B
VEGETATION			
Seedtree with reserves	Acres	0	287
Shelterwood with reserves	Acres	0	83
Clearcut with reserves	Acres	0	20
Site Preparation –			
burning	Acres	0	39
slashdown and burning	Acres	0	350
slashdown	Acres	0	40
Regeneration– Oak planting	Acres	0	0
Pine planting	Acres	0	307
Natural	Acres	0	122

Table 8. Comparison of Alternatives

Seedling release-chemical	Acres	0	390
TRANSPORTATION			
Road Reconstruction	Miles	0	3.3
Temporary Rd Construction	Miles	0	2.1
Relocation and Construction	Miles	0	1.7
Road Maintenance	Miles	19.1	18.5
Road Construction	Miles	0	.7
WILDLIFE			
TVA Transmission Line Maintenance-chemical	Miles	0	10.5
Maintenance of linear and spot openings	Acres	43	43
Creation of ephemeral pools	Number	0	10-30
FUELS REDUCTION			
Dormant season burning	Acres	0	4,250

ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected analysis area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

As required by 36 CFR 219 the best available science was used in this analysis. The project record demonstrates a thorough review of relevant scientific information, consideration of responsible opposing views, and where appropriate, the acknowledgement of incomplete or unavailable information, scientific uncertainty, and risk.

Most of the Greasy Creek analysis area is contained within the Forest Service acquisition tracts K-1 and K-3 (USDA undated). Both tracts were purchased in 1912 from the Ocoee Timber Company, a subsidiary of the Tennessee Timber Company. The tracts were among the first acquisitions of the CNF and were purchased under provisions of the Weeks Act of 1911. When the tracts were purchased by the Forest Service, the seller retained logging rights to portions of the tracts.

The analysis area was extensively logged between 1890 and the 1930 with peak logging probably occurring in the 1920's. The area was sparsely settled before Forest Service acquisition. Typically, the local population relied on subsistence farming and logging. It was common practice to use fire to clear and maintain fields and forest for grazing. The logging history and the subsequent wildfires resulted in a large portion of the area in 71 to 100 year age class.

Very little active management took place in the analysis area in the years after the land was acquired. During the last 90 years of Forest Service administration, substantial progress has been made with wildfire prevention and control in the analysis area and the CNF in general. The

reduction of wildfire has had a number of effects on the landscape, and it has aided the regeneration and establishment of fully stocked forest stands in the analysis area.

Very little even age timber harvesting took place in the analysis area between the 1930's and the 1960's. Some thinning and uneven-aged regeneration may have occurred, though records are sketchy. Approximately 26 percent of the analysis area has been regenerated by even aged methods in the last 40 years.

The SPB impacted the analysis area between 1999 and 2002. Some nearly pure stands of pine and many scattered individual pine were killed. The species affected were Virginia, pitch, shortleaf and white pine.

The present forest composition on the ridges and upper slopes is predominantly shortleaf and Virginia pine and upland oak species. Coves and lower slopes have yellow poplar, white pine, white oak and hemlock. Most of the forest acreage (approximately 60 %) is greater than 70 years of age due to past land management practices.

Activities that have occurred in the analysis area in the recent past (1990's- 2007) include: harvesting (Slick Rock); prescribed burning; recreational uses (i.e. camping, hiking, mountain biking, hunting, fishing, organized camp permits, etc.); utility right-of-way (ROW) and electronic site maintenance; bridge reconstruction on Rock Creek and Clear Creek on Highway 30; and as mentioned above impacts from SPB.

Activities that are currently occurring in the analysis area include: prescribed burning; recreational uses; maintenance of roads, existing ROWs, trails and campgrounds; changes in private land use patterns; restoration of areas impacted by SPB; and impacts from hemlock wooly adelgid (HWA).

Reasonably foreseeable activities expected in the analysis area include: maintenance of roads, existing ROW's, trails and campgrounds; prescribed burning; restoration of areas impacted by SPB; recreational uses; impacts from HWA; changes in private land use patterns; changes in Highway 64; treatments of non-native invasive species; and development of trails from proposed CNF trails strategy.

Biological Factors

This section discloses effects to biological elements of the environment expected as a result of implementing the Proposed Action or alternatives. The biological environment includes the diversity of plant and animal communities, habitat components, and individual species of concern or interest. Analysis of effects to these elements is organized in this document following the framework used during forest planning (USDA 2004b). Use of this framework is designed to ensure comprehensive consideration of effects to the biological environment. Elements in this framework are listed in Table 9, where they are assessed for their relevance to this project. Only those relevant to the project are analyzed further in this document.

Forested community types and successional stages were calculated using data from the USDA Forest Service "R8 FSVeg Age Class Distribution" table run on February 25, 2008. Data for the 12 compartments in the Greasy Creek analysis area (301, 302, 303, 304, 305, 306, 307, 309, 311, 312, 357, and 375) were used. Successional stages were analyzed based on the year 2009 for each alternative.

Table 9. Elements of the biological environment, derived from RLRMP analysis, and their relevance to the Greasy Creek area.

Biological Element	Discussed Further?	Relevance to this Project
Mesic Deciduous Forest	No	Mesic deciduous forests occur on 2891 acres (22%) in the area, however none are proposed for treatment.
Spruce-fir Forest	No	There are no spruce-fir forests in the area.
Eastern Hemlock and White Pine Forest	Yes	Hemlock or white pine forests occur on 2163 acres (16%) in the area, and 149 acres would be impacted by the proposed activities..
Oak and Oak-pine Forest	Yes	Oak and oak-pine forests occur on 3355 acres (25%) in the area. None are proposed for treatment, however the action alternative would create oak stands.
Pine and Pine-oak Forest	Yes	Pine and pine-oak forests occur on 6870 acres (52%) in the area and 241 acres would be impacted by the proposed activities..
Woodlands, Savannas, and Grasslands	No	None of this type of habitat would be created and maintained
Rare Communities		
Wetland Communities	Yes	This type of habitat occurs in the area.
Barrens, Glades, and Associated Woodlands	No	None of this type of habitat occurs in the area.
Carolina Hemlock Forests	No	None of this type of habitat occurs in the area.
Table Mountain Pine Forests	No	There are no known acres of this forest type in the area.
Basic Mesic Forests	No	Occurrence of this forest type in the area is unknown.
Beech Gap Forests	No	None of this type of habitat occurs in the area.
Rock Outcrops and Cliffs (includes forested boulderfields)	Yes	Cliffs and Bluffs occur along the Ocoee River.
High Elevation Balds and Meadows	No	None of this type of habitat occurs in the area.
Caves and Mines	No	No caves are known to occur in the area.
Successional Habitats	Yes	Vegetation manipulation activities would alter the forest age-class distribution.
High Elevation Early Successional Habitats	No	None of this type of habitat occurs in the vicinity of the affected areas.
Permanent openings and old fields, Rights-of way, Improved pastures	Yes	The project proposes to maintain this type of habitat
Forest Interior Birds	No	The affected area is not identified in

Table 9. Elements of the biological environment, derived from RLRMP analysis, and their relevance to the Greasy Creek area.

		the RLRMP as an area where edge effect is an issue.
Old Growth	Yes	This type of habitat may occur in the area.
Riparian Habitats	Yes	Riparian habitats occur within or near the proposed affected areas.
Snags, Dens, and Downed Wood	Yes	Snags occur in or near the proposed affected areas.
Aquatic Habitats	Yes	Aquatic habitats occur in the proposed affected areas.
Threatened and Endangered Species	Yes	Potential effects to T and E species will be analyzed.
Demand Species	Yes	Demand species could be impacted by the project.
Migratory Birds	No	Migratory bird issues are included in individual Major Forested Communities sections and therefore are not represented in a separate section.
Invasive Non-native Plants and Animals	Yes	Invasive non-natives are located in the area.
Species Viability	Yes	Species with viability concerns occur in the area.
Forest Health	Yes	Forest health is an issue in the area.

The RLRMP selected management indicator species (MIS) as a tool to help indicate effects of management on some elements of this framework. A subset of these MIS is selected for consideration in this analysis because their populations or habitats may be affected by the project (Table 10)

Table 10. Forest-level Management Indicator Species

Species Name	Purpose	Selected for Project Analysis?	Reasons for Selection/Non-Selection
Prairie warbler	To help indicate management effects of creating and maintaining early successional forest communities	Yes	Some proposed activities would create early successional communities.
Chestnut-sided warbler	To help indicate management effects of creating and maintaining high elevation early successional forest communities and habitat	No	There are no high elevation communities associated with the affected area.
Pine warbler	To help indicate effects of management in pine and pine-oak communities	Yes	Pine and pine oak communities occur in the vicinity of the project and some are subject to management actions.
Pileated woodpecker	To help indicate management effects on snag dependent	Yes	Forests with snags occur in the vicinity of the project and some are

Table 10. Forest-level Management Indicator Species

	wildlife species		subject to management actions.
Acadian flycatcher	To help indicate management effects within mature riparian forest community	Yes	Riparian habitats occur near the proposed affected areas.
Scarlet tanager	To help indicate effects of management in xeric oak and oak pine communities	Yes	Xeric oak and oak pine communities occur in the vicinity of the project, and would be created by the action alternative.
Ruth's golden aster	To help indicate management effects on the recovery of this T&E plant species	No	No populations of this species or their habitat occur in or near the vicinity of the project.
Ovenbird	To help indicate management effects of wildlife species dependent upon mature forest interior conditions	No	The affected area is not identified in the RLRMP as an area where edge effect is an issue.
Black bear	To help indicate management effects on meeting hunting demand for this species	Yes	Hunting demand for black bear could be impacted by the alternatives.
Hooded warbler	To help indicate effects of management on providing dense understory and midstory structure within mature mesic deciduous forest communities	No	Mesic deciduous communities occur in the vicinity of the project, however none are subject to management actions.

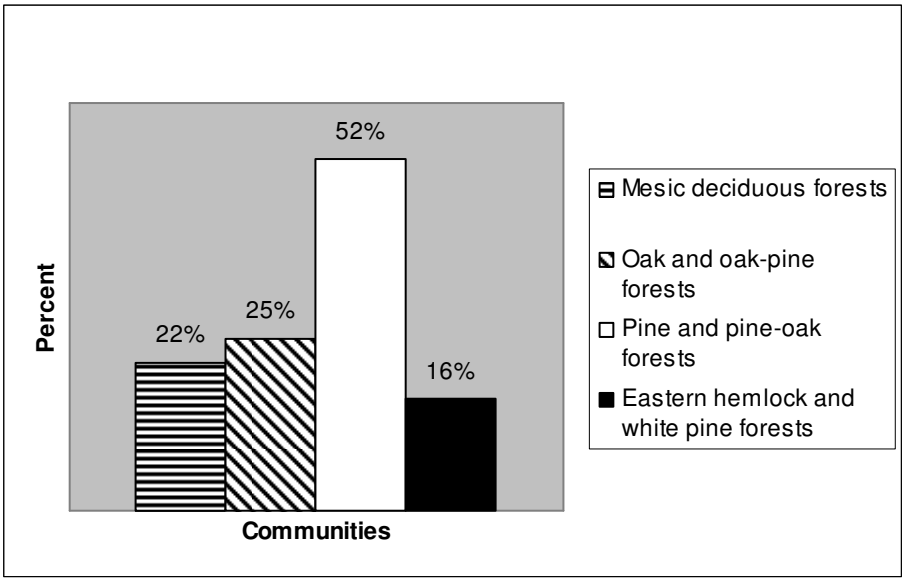
Existing Condition

The analysis area encompasses approximately 12,910-acres within the Ocoee River watershed. The area varies widely in topography, from sloping hills and flatter areas around the streams to steeper slopes on ridges in the area. Elevations are from approximately 845 feet to 3,000 feet above sea level. Dry upland sites occupied by white pine, yellow pine, upland hardwood, and mixed stands are characteristic of the overall area; cove sites are also present and include yellow poplar, white pine, white oak and hemlock as predominant overstory species. Common shrub zone species including mountain laurel, blueberry, huckleberry, and greenbrier are present. Common herbaceous species include galax, poison ivy, ferns, trillium, and smilax. Approximately 49% of the 12 compartments are greater than 80 years of age. There are currently 277 acres within the 0-10 year age class (base year 2009) of the total forested acres in the 12 compartments.

Perennial water sources are readily accessible from all parts of the compartments. Openland, grassy wildlife openings within the compartments total approximately 31 miles of linear wildlife openings and approximately 16 acres of spot openings. A utility corridor under a special use permit to Tennessee Valley Authority is present on about 2.5 miles of the analysis area. The corridor was recently mowed to remove larger diameter vegetation.

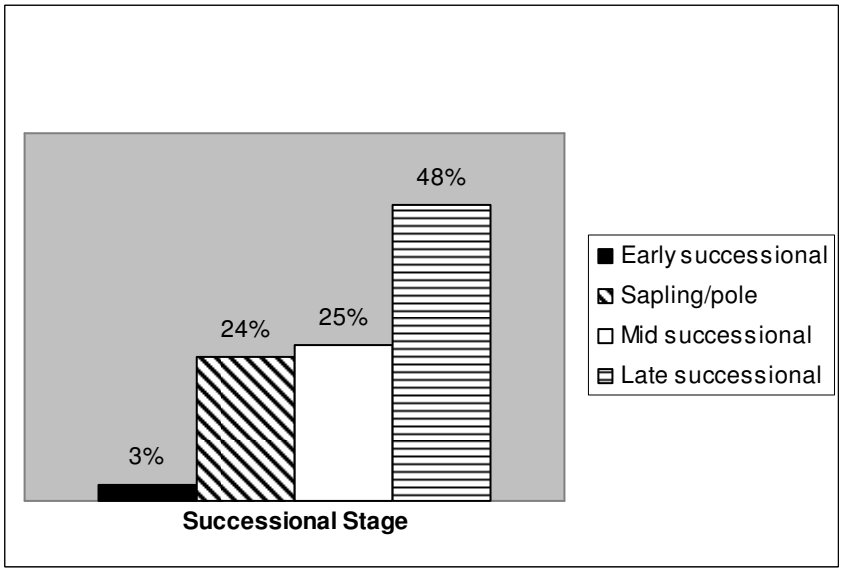
The percentage distribution of major forest communities and corresponding successional stages are presented in Figures 2 and 3. The following chart (Figure 2) displays the major community groups in the area. The percentages of the major forested communities do not equal 100% because some forest types can be a component of more then one community.

Figure 2. Greasy Creek Major Forested Communities



Pine and pine-oak forests comprise the majority of the landscape at 52%. Oak and oak-pine forests are the next most plentiful, while mesic deciduous forests and eastern hemlock and white pine forests are the least abundant. Community descriptions can be found in the RLRMP FEIS (USDA 2004b) beginning on page 97.

Figure 3. Greasy Creek Successional Stages Existing Condition



Data for the analysis area and surrounding landscape (approximately 28,473 acres including compartments 150, 151, 152, 154, 155, 156, 157, 173, 174, 175, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 314, 357, 358, and 375) has been analyzed for cumulative effects.

Forage availability (herbaceous material, browse, and soft mast) is low to moderate throughout most of the forest in the area. Snag density appears to be average to high. This is a result of several factors including the recent SPB outbreak, stand age and condition, species composition, and further susceptibility to insect, disease, and storm damage. Snag densities are expected to increase as existing stands mature and pines continue to die. Cover in the form of shrubby habitat is low to moderate. Many of the streams and hollows in the area have a good deal of downed trees, primarily as a result of past storms and insect outbreaks.

In the stands proposed for harvest, the dominant overstory component is conifer and mixed conifer-hardwood. The midstory and herbaceous layers vary within forest types and communities.

The primary wildlife management concern within the Greasy Creek compartments is the lack of habitat diversity. Proposed actions are aimed at restoring communities based on their ecological potential. From a wildlife standpoint, proposed actions are designed to diversify vegetation by increasing the amount of 0-10 year old stands in order to increase browse and cover, creating open woodlands for foraging and nesting habitat, promoting hard mast production by planting oak as well as planting pine on a wide spacing within harvested stands thereby allowing reproduction of oaks, controlling non-native invasive plant species, and increasing upland water sources.

The following sections describe the affected environment and effects by alternative for each biological element listed above in Table 9.

Existing Condition Eastern Hemlock and White Pine forest

Eastern hemlock and white pine forests are broadly defined to include those forested communities that are either dominated or co-dominated by eastern hemlock (*Tsuga canadensis*) or eastern white pine (*Pinus strobus*) in the canopy. For the purposes of this assessment, forests with a significant component of eastern hemlock are classified as hemlock forests, even where white pine may be dominant (CISC types 4, 5, 8). White pine forests include all other forests where white pine is dominant (CISC types 3, 9, 10). This division puts priority on the presence of hemlock as a key habitat component.

Eastern hemlock forests typically occur on acidic soils and often have a dense shrub layer composed of ericaceous species. These communities are typically low in herbaceous diversity, but may support rich bryophyte communities. White pine forests occupy similar sites but also may occur on dryer locations, particularly in areas where fire has been suppressed. White pine forests have also been artificially created as timber plantations.

The combination of a largely evergreen canopy and a dense midstory in naturally occurring hemlock and white pine forests provide for a variety of benefits, including shading and cooling of riparian systems, thermal cover for wildlife, and nesting and foraging habitat for several species of neotropical migrant birds dependent upon the layered canopy structure and understory thickets (RLRMP). There is some evidence that hemlock-white pine forests provide necessary habitat components for the long-term conservation of red crossbills (RLRMP).

Eastern hemlock forests may also be important refugia for species typically adapted to higher elevations. Red-breasted nuthatches, winter wrens, and golden-crowned kinglets are found in late successional hemlock forests down to elevations of 2,000 feet, and several species of rare bryophytes that are known to occur primarily within the spruce/fir zone are also found at lower elevations in humid gorges often under a canopy that includes eastern hemlock (RLRMP).

The current amount and distribution of mature eastern hemlock forests is threatened by the recent emergence of the hemlock woolly adelgid in the southern Appalachians. First identified in the eastern U.S.A near Richmond, VA in the early 1950's, this exotic pest has recently spread into the southern Appalachians and threatens to spread throughout the range causing mortality within five years after initial infestation (SAMAB 1996).

On the CNF, eastern hemlock forests are found primarily in association with north facing coves and slopes and riparian systems. Years of fire suppression have allowed individual hemlocks and white pine to creep upslope onto more xeric slopes and ridges where they would not likely exist under a natural fire regime. There are currently approximately 45,125 acres of white pine forest types on the CNF, 6,664 acres of which originated as plantations. This assessment area includes 2,163 acres of hemlock or white pine forests.

Two key habitat variables are selected as management indicators to monitor the condition of eastern hemlock and white pine forests. The number of acres of hemlock forests infested with hemlock woolly adelgid and the number of acres of white pine plantations restored to diverse native communities will be tracked annually.

Direct and Indirect Effects Eastern Hemlock and White Pine Forest

The action alternative proposes a maximum of 149 acres of white pine forests be treated by timber harvest. Table 11 shows the number of acres of white pine forest that would be affected by timber harvest under each alternative by treatment type.

Table 11. White Pine Forest

Treatment	Alt. A	Alt. B
Seedtree or shelterwood with reserves	0 acres	149 acres
Total	**0 acres**	**149 acres**

Alternative A (No Action)

Without treatment in white pine forests, white pine would increase and continue to become established in forests where it is not historically naturally occurring. Oaks and other native species would decrease leading to a reduction in mast and other wildlife habitat components. Non-native invasive species would also continue to increase due to a lack of management. Native plants would be displaced and suitable habitat for wildlife would decrease.

Alternative B (Proposed Action)

Under this alternative, 149 acres would be harvested to begin restoration of diverse natural communities. The eventual forested stands would approximate desired future conditions favoring a mixed stand of tree species. This would increase the diversity of the forest and eventually favor more mast producing species.

The use of prescribed fire is designed to restore these plant communities to a more natural species assemblage, and would likely have a long-term beneficial effect on organisms associated with these communities. The goal is to restore natural communities which have been displaced by off-site tree species including white pine and other vegetation. These would lead to the diversification of the forest as a whole which would benefit many animal species by creating more forage, nesting, and brood habitat. Herbicide use would reduce the number of non-native invasive species leading to an increase in native plants and wildlife habitat. The other actions in

Alternative B, including herbicide use, maintenance of wildlife openings, planting pine and oak, creation of ephemeral pools, road construction and reconstruction and other activities would not appreciably affect the community.

Cumulative Effects Eastern Hemlock and White Pine Forest

All Alternatives

Prescribed burning near any of the affected areas would reduce white pine in the understory. White pine is susceptible to burning. Without burning and other treatments to reduce the amount of white pine, it would continue to increase across the analysis area. Noxious weed species would also increase without treatments for control. Non-native invasive species crowd out native species, decreasing habitat for native wildlife.

Other timber harvests that have taken place are so minimal as to have almost no effect. Despite protection and restoration objectives given in the RLRMP, the current amount and distribution of mature eastern hemlock forests is threatened by the recent emergence of the hemlock wooly adelgid in the southern Appalachians. The fact that this community type is naturally limited in distribution, coupled with the impending threats from the hemlock wooly adelgid that will impact the species regardless of land ownership, leaves the long-term maintenance of historical distribution and abundance of this community type in question.

Any development on private land would potentially decrease the availability of this habitat. Other past, present and reasonably foreseeable activities (see pgs. 16-17) would have little effect.

Existing Condition Oak and Oak-pine Forest

Oak dominated forests covered under this section include dry to mesic oak and oak-pine forests. Dry-mesic oak forests vary greatly in their species composition due to their wide distribution. The major species include chestnut oak (*Quercus montana*), northern red oak (*Q. rubra*), black oak (*Q. velutina*), white oak (*Q. alba*), and scarlet oak (*Q. coccinea*) (USDA 2004b). The predominant forest type included in the analysis area in this community is white oak-red oak-hickory. The dry to mesic oak-pine forests considered here are oak-dominated forests containing a significant pine component. Predominant pine species include white pine (*Pinus strobus*), shortleaf pine (*P. echinata*), Virginia pine (*P. virginiana*), and loblolly pine (*P. taeda*).

In the southern U.S., acres of oak-hickory and oak-pine forests have increased over the last 50 years (USDA 2004b). Oak and oak-pine forests are common throughout the South, comprising over half of the timberland of the region as a whole (USDA 2004b). Oak-hickory forests are the dominant forest type in the Southern Appalachian Ecoregion.

Oak forests are abundant on the CNF, comprising 36 percent of the CNF acreage. These forests are very well distributed within the northern portion of the CNF. Oak forests are less evenly distributed on the southern CNF, especially along the pine-dominated lower elevations including Starr Mountain and the lower Citico Creek drainage; and in the highest elevations, where mesic deciduous forest types predominate.

Several management indicators have been identified for assessing effects to oak and oak-pine forest communities. These indicators include both MIS and key habitat variables. Because of their wide distribution across moisture gradients, mid- and late-successional oak and oak-pine forests support a wide variety of species. Drier oak forests support a slightly different mix of species due to their more open condition. To represent this upland oak community, the scarlet

tanager is selected as an MIS. This species is most abundant in upland mature deciduous forest (Hamel 1992).

Scarlet Tanager (MIS)

The breeding range of scarlet tanager (*Piranga olivacea)* includes eastern North Dakota and southeastern Manitoba across southern Canada and northern U.S. to New Brunswick and central Maine, south to central Nebraska, Kansas, Oklahoma, Arkansas, northern Alabama, northern Georgia, northwestern South Carolina, western North Carolina, central Virginia, and Maryland (NatureServe 2004). North American Breeding Bird Survey data indicate a stable population in the Eastern U.S. from 1966-2005, but a declining trend in the Blue Ridge Mountains in the same time period (Sauer et al. 2005). Habitat on breeding grounds is deciduous forest and mature deciduous woodland, including deciduous and mixed swamp and floodplain forests and rich moist upland forests. The scarlet tanager prefers oak trees for nesting. They nest less frequently in mixed forest and are most common in areas with a relatively closed canopy, a dense understory with a high diversity of shrubs, and scanty ground cover. They are able to breed successfully in relatively small patches of forest. Tanagers also sometimes nests in wooded parks, orchards, and large shade trees of suburbs. They are known to breed in various forest stages but are most abundant in mature woods (according to some sources, prefers pole stands).

Direct and Indirect Effects Oak and Oak-pine Forest

Alternative A (No Action)

There would be no direct effects of the No Action Alternative. However, there would be indirect effects by no action. Prescribed fire would not be used. Lack of treatment with burning and timber removal would mean oak trees preferred by nesting scarlet tanagers would age and fall from the canopy, and would be often replaced by white pine or maple. This would lead to a reduction in scarlet tanager habitat. No new oak-pine habitat would be created.

Alternative B (Proposed Action)

Under this alternative, approximately 83 acres would be treated to regenerate oak and oak pine. Burning and other treatments to stimulate oak regeneration would benefit natural systems. The goal of the timber harvest and other treatments is to restore natural communities which have been displaced by off-site tree species including white pine and other vegetation. These would lead to the diversification of the forest as a whole which would benefit many animal species by creating more forage, nesting, and brood habitat.

These treatments would have both negative and positive impacts to scarlet tanager. Removal of the overstory would reduce nesting sites in those stands. However, the stands proposed for treatments are currently not preferred nesting habitat. In addition, the harvest would diversify the understory. Suitable habitat would increase as the stands grow. There would also be ample habitat remaining in the surrounding forest. Conditions in other areas would remain relatively stable as the forest ages with the possible exception of natural storm events or wildfire.

Herbicide use would promote desired species growth, contributing to an increase in habitat for wildlife. Burning would further promote oak regeneration and help restore these plant communities to a more natural species assemblage, and would likely have a long-term beneficial effect on organisms associated with these communities. The other actions in Alternative B, including herbicide use in the utility corridor, maintenance of wildlife openings, planting pine and oak, creation of ephemeral pools, road construction and reconstruction and other activities

would not appreciably affect the community with the exception of planting oak which would benefit the community and MIS long term.

Cumulative Effects Oak and Oak-pine Forest

Alternative A (No Action)

Insects and diseases such as gypsy moth and oak decline are expected to have an overall negative effect on oak forests in the future (SAMAB 1996). Several gypsy moth infestations have been detected in the Forest's northeastern counties, and spread of the infestation is expected to expand throughout the Forest by 2020. Many of the older xeric oak forests are experiencing oak decline. The greatest impact of oak decline would be immediately behind the advancing front of gypsy moth due to repeated severe defoliations. As existing oak stands grow older, susceptibility would increase. Although oaks would not be eliminated from effected areas, oak abundance and diversity would be reduced. On both national forest and private lands, the future of oak forests would largely depend on management activity such as thinning and burning that encourage oak reproduction to offset the impacts of these insects and diseases.

Past prescribed burns may have reduced the understory temporarily, thus affecting foraging habitat for the MIS. However, with the understory sprouting that typically occurs after a prescribed burn, the area would again provide better habitat to tanagers within a year or two. There would be no cumulative effect to scarlet tanagers because burns would take place in different years, so that the understory over a large area would be in different stages of regrowth.

Other timber harvests that have taken place are so minimal as to have almost no effect. The SPB outbreak likely benefited the scarlet tanager when sunlight from the increased canopy openings caused a flush of new and dense undergrowth.

The death of hemlock from hemlock woolly adelgid apparently would not affect this community or MIS to any extent, but its effects are not clear. Any development on private land would potentially decrease the availability of this habitat. Other past, present and reasonably foreseeable activities (see pages 16-17) would have little effect.

Cumulatively, Alternative A would not have an effect to scarlet tanager.

Alternative B (Proposed Action)

Insects and diseases such as gypsy moth and oak decline are expected to have an overall negative effect on oak forests in the future (SAMAB 1996). Several gypsy moth infestations have been detected in the Forest's northeastern counties, and spread of the infestation is expected to expand throughout the Forest by 2020. Many of the older xeric oak forests are experiencing oak decline. The greatest impact of oak decline would be immediately behind the advancing front of gypsy moth due to repeated severe defoliations. As existing oak stands grow older, susceptibility would increase. Although oaks would not be eliminated from effected areas, oak abundance and diversity would be reduced. On both national forest and private lands, the future of oak forests would largely depend on management activity such as thinning and burning that encourage oak reproduction to offset the impacts of these insects and diseases. One of the management objectives of this project is to enhance oak. The action alternative would revert some acres to early successional habitat conditions, which may have some long-term forest health benefits through diversification of age-class distributions.

Prescribed burning in or near any of the affected areas would remove understory in some areas, making the area temporarily less attractive to scarlet tanagers. However, with the understory sprouting that typically occurs after a prescribed burn, the area would again provide better habitat to tanagers within a year or two. Burns would take place in different years, so that the understory over a large area would be in different stages of regrowth.

Other timber harvests that have taken place are so minimal as to have almost no effect. The SPB outbreak likely benefited the scarlet tanager when sunlight from the increased canopy openings caused a flush of new and dense undergrowth.

The death of hemlock from hemlock woolly adelgid apparently would not affect this community or MIS to any extent, but its effects are not clear. Any development on private land would potentially decrease the availability of this habitat. Other past, present and reasonably foreseeable activities (see page 19) would have little effect.

Cumulatively Alternative B would benefit scarlet tanagers in some areas and have no effect in other areas.

Existing Condition Pine and Pine-oak forest

Pine dominated forests covered in this section include all "Southern Yellow Pine"

(RLRMP) forest types with various mixtures of hardwood species occurring as minor components. These forests occur on a variety of landforms at a wide range of elevations. Historically, in the Blue Ridge Physiographic Province, these communities occupied areas that were subject to natural fire regimes and typically occurred on ridges and slopes with southern exposures (NatureServe 2002). However, due to a combination of previous land use, fire exclusion, and intensive forestry (plantations), many pine species have expanded beyond their natural range and today, pine-dominated communities can be found on virtually all landforms and aspects.

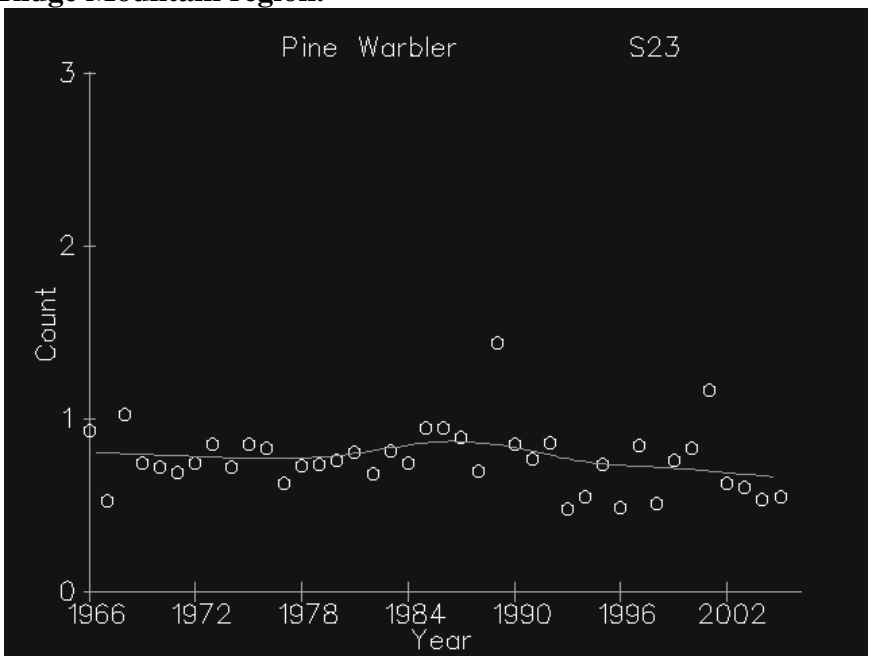
The assessment area includes 52% (6,870 acres) pine and pine-oak communities.

Pine Warbler (MIS)

The pine warbler (*Dendroica pinus*) is a short-distance migrant and summer resident that occurs primarily at elevations below 3500 feet. It is apparently more abundant on the southern ranger districts of the Cherokee National Forest. Based on 1992-1993 point count data collected on the Tellico Ranger District, this species is not a predominant component of any community type, but was detected in yellow pine forest types across all successional stages. Point count data collected for this species from 1996-2002 on the Tellico and Ocoee/Hiwassee Ranger Districts, indicates 88% of pine warbler observations were in conifer forests, 17% were in early successional vegetation, 54% were in mid successional, and 29% were in late successional.

The overall regional population trend (Blue Ridge Mountains) for 1966-2005 is a slow and slight decrease (Figure 4) (Sauer et al. 2005).

Figure 4. Breeding Bird Survey trend data for Pine Warbler, Blue Ridge Mountain region.



Direct and Indirect Effects Pine and Pine-oak Forests

Table 12 shows the number of acres of pine and pine-oak forests that would be affected by timber harvest under each alternative by treatment type.

Table 12. Pine and Pine-oak Forests

Treatment	Alt. A	Alt. B
Seedtree with reserves	0 acres	205 acres
Shelterwood with reserves	0 acres	16 acres
Clearcut with reserves	0 acres	20 acres
Total	**0 acres**	**241 acres**

Alternative A (No Action)

There would be no direct effects of the No Action Alternative. However, there would be indirect effects by no action. Prescribed fire and herbicide would not be used. Lack of treatment with burning and timber removal would mean shade tolerant species, likely white pine or maple, would secede into pine and pine-oak communities reducing habitat of species which prefer those habitat types. This would lead to a reduction in pine warbler habitat. The utility corridor would be populated with larger trees of both pine and hardwood.

Alternative B (Proposed Action)

Under Alternative B, 241 acres of pine and pine-oak would be treated by timber harvest. The timber harvest and other treatments would promote and maintain these communities. The maintenance of naturally occurring pine and pine-oak would benefit species dependent on that habitat type, including the pine warbler. Furthermore, the amount of shade tolerant species that would replace these communities without treatment would be reduced.

Creation of early successional habitat within this forest type is intended to provide optimal habitat conditions for species that depend on both late and early successional habitats including black bear, white-tailed deer, eastern wild turkey, ruffed grouse, and a variety of non game species. Shrubby and grassy habitats interspersed among the remaining mid to late successional habitats within the activity area provide soft mast and other forage, cover, and bugging areas important to those species. The importance of this habitat is further discussed in the section of this document pertaining to "Successional Habitats".

The use of prescribed fire is designed to restore these plant communities to a more natural species assemblage, and would likely have a long-term beneficial effect on organisms associated with these communities. Burning and other treatments to open these stands would benefit natural systems. The goal is to restore natural communities which have been displaced by off-site tree species including Virginia pine and other vegetation. These would lead to the diversification of the forest as a whole which would benefit many animal species by creating more forage, nesting, and brood habitat. Herbicide use in the utility corridor would prevent regrowth of pine and oak creating a permanent early successional stage. Herbicide use in cut stands would lead to establishment of desired pine and oak species. The other actions in Alternative B, including maintenance of wildlife openings, planting pine and oak, creation of ephemeral pools, road construction and reconstruction and other activities would not appreciably affect the community.

Cumulative Effects Pine and Pine-oak Forests

All Alternatives

Prescribed burning in or near any of the affected areas would benefit this community by suppressing shade tolerant species. Pine and pine-oak communities would be favored.

Other timber harvests that have taken place are so minimal as to have almost no effect. The SPB outbreak likely benefited the community and MIS in some areas where pine was either planted or regenerated naturally. In other areas where red maple and other species are prolific, the community did not respond favorably.

The death of hemlock from hemlock wooly adelgid apparently would not affect this community or MIS to any extent, but its effects are not clear. Any development on private land would potentially decrease the availability of this habitat. Other past, present and reasonably foreseeable activities (see pgs. 16-17) would have little effect.

Cumulatively Alternative A would benefit the community and MIS in some areas and have no effect in other areas.

Existing Condition Rare Communities

Rare communities are assemblages of plants and animals and unique substrates that typically occupy a small portion of the landscape, but contribute significantly to biodiversity. They generally are limited in number of occurrences, small in size, and have relatively discrete boundaries. Forest Wide Standard 47 of the Revised Land and Resource Management Plan (RLRMP) states that rare communities, wherever they occur on the forest, will be managed under the rare community prescription (USDA 2004a). This is done to ensure their contribution to meeting goals for community diversity, endangered and threatened species recovery, and species viability.

There are no existing mapped rare communities within the project area. The Rock Creek Gorge Scenic Area, located between the Chilhowee Recreation Area and Ocoee Scenic Byway, is a steep, narrow gorge along Rock Creek. A series of waterfalls and cascades characterize the area, including the 65-foot Benton Falls. There is potential for small occurrences of rare communities within this gorge. The project area also includes a small portion of the Ocoee River gorge which contains scattered occurrences of rocky bluffs and cliffs. Botanical surveys conducted within the stands proposed for vegetation management treatments describe two occurrences of Cumberland Forested Acid Seeps. One very small occurrence in stand 357/40 and a much larger occurrence within stand 375/08.

Direct and Indirect Effects Rare Communities

Alternative A (No Action)

Under Alternative A, no changes to the existing environment would occur beyond those attributed to natural disturbances. Based upon the above information, implementation of Alternative A would have no effect on rare communities.

Alternative B (Proposed Action)

Cumberland Forested Acid Seeps are listed as a rare community type in the RLRMP and are to be managed under the standards of the rare community prescription, Rx 9F (USDA 2004a). Based upon implementation of these standards there would be no effects to rare communities as a result of this project.

Cumulative Effects Rare Communities

All Alternatives

The Cherokee National Forest Revised Land and Resource Management Plan (RLRMP) recognizes the value of rare communities on the landscape and provides for their protection. It is estimated that more than 50% of the nation's wetlands have been destroyed in the past 200 years (Ernst and Brown 1988). Because wetlands are so vulnerable to destruction on private land, it is critical to maintain these communities where they occur on national forest land. Because the CNF places priority on protection and maintenance of rare communities regardless of alternative, cumulative effects on national forest lands are expected to be positive.

Existing Condition Successional Habitats

Forest age and related structure are key determining factors for presence, distribution, and abundance of a wide variety of wildlife. Some species depend on early-successional habitats, some depend on late-successional habitats, and others depend on a mix of both occurring within the landscape (RLRMP). These habitat conditions are also important as wintering and stopover habitats for migrating species. In order to support viability of diverse plant and animal populations and to support demand for game species, a variety of habitat types are needed within national forest landscapes.

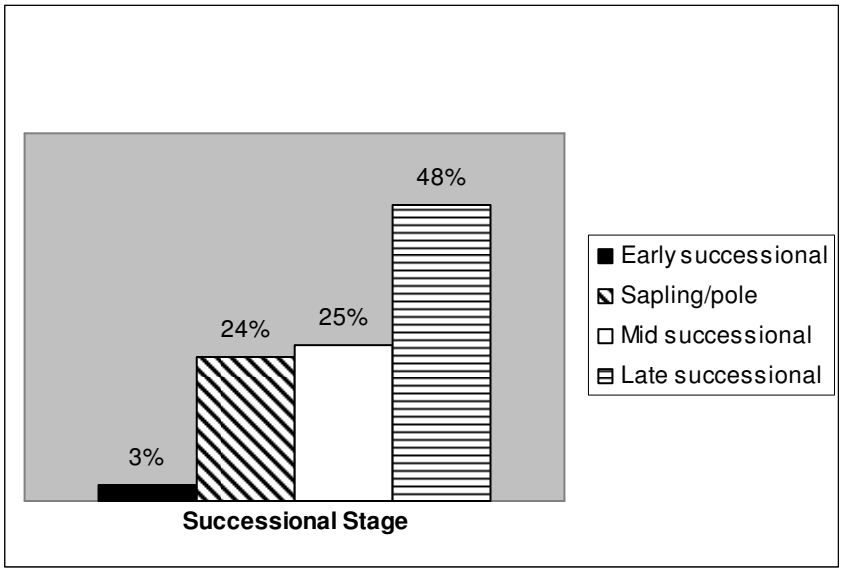
This section deals only with successional forest conditions. Permanent openings such as open woodlands, savannas, grasslands, barrens and glades, balds, wildlife openings, old fields, pastures, and rights-of-way are covered elsewhere in this document. Mid- and late-successional/old growth conditions can be found under individual forest community sections.

Early-successional forests are important because they are highly productive in terms of forage, diversity of food sources, insect production, nesting and escape cover, and soft mast. Early-successional forests have the shortest lifespan (10 years) of any of the forest successional stages, and are typically in short supply and declining on national forests in the Southern Appalachians, and in the eastern U.S.A (RLRMP). Early-successional forests are also not distributed regularly or randomly across the landscape. These habitats are essential or beneficial for some birds (ruffed grouse, chestnut-sided warbler, golden-winged warbler, prairie warbler, yellow-breasted chat, blue-winged warbler); beneficial to deer, turkey, and bear in the South; and sought by hunters, berry pickers, crafters, and herb gatherers for the opportunities they provide. Many species commonly associated with late-successional forest conditions also use early successional forests periodically, or depend upon it during some portion of their life cycle (RLRMP).

Approximately 49% of the acreage in the 12 compartment assessment area is greater then 80 years of age at this time. There are currently 277 acres (3%) within the 0-10 year age class (base year 2009) of the total forested acres.

The percentage distribution of successional stages is presented in Figure 5 .

Figure 5. Greasy Creek Existing Successional Stages



Prairie Warbler (MIS)

Prairie warblers (*Dendroica discolor*) are shrub land-nesting birds found in suitable habitats throughout the southern Appalachians (Hamel 1992). Prairie warblers require dense forest regeneration or open shrubby conditions in a forested setting. Near optimal habitat conditions are characterized by regeneration, thinned areas or patchy openings ten acres or more in size where woody plants average two to three meters in height, three to four centimeter in diameter, and occur in stem densities around 3,000 stems/acre (USDA 2004b). Populations respond favorably to conditions created three to ten years following forest regeneration in larger forest patches. Providing a sustained flow of regenerating forests is necessary to support populations of prairie warbler. Populations of prairie warbler have been steadily declining in the eastern U.S. (Trend -2.08, P value 0.0000; Sauer et al. 2005).

Direct and Indirect Effects Successional Habitats

Alternative A (No Action)

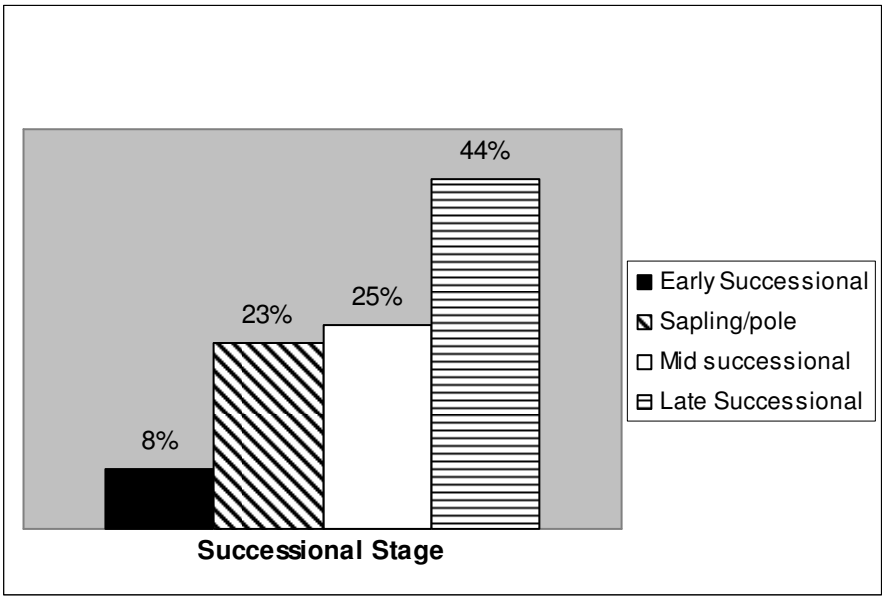
No additional early successional habitat would be created with this alternative. Forests would continue to age, affected by an increase in shade tolerant species that don't provide habitat for species that use these communities. There are currently 277 acres of existing forest in the 0-10 year age class, (3% of the analysis area).

This alternative would have no direct or indirect effect to prairie warbler. Habitat conditions would remain relatively stable as the stands age with the possible exception of natural storm events or wildfire.

Alternative B (Proposed Action)

Under these alternatives, 390 acres (5% of the area) would be treated to create early successional habitat in Alternative B. Creation of early successional habitat is intended to provide optimal habitat conditions for species that depend on early successional habitats including chestnut-sided warbler, golden-winged warbler, prairie warbler, yellow-breasted chat, and blue-winged warbler. The percentage distribution of successional stages if Alternative B is implemented is presented in Figure 6.

Figure 6. Greasy Creek Successional Stages Alternative B



The proposed action would harvest 390 acres of forest bringing the early successional age class to 8%. None of the other proposed activities would affect prairie warbler because they don't affect its habitat. Alternative B would create 390 acres or 8% more prairie warbler habitat.

Alternative B would benefit prairie warbler by creating more nesting habitat.

Cumulative Effects Successional Habitats

All Alternatives

Any activity which would open the understory and create patchy openings would benefit this community and MIS. This includes prescribed burning, timber harvest, utility rights of way

herbicide and SPB affected areas. Recreation would not affect these types of habitats. Therefore, there would be beneficial cumulative effects to prairie warbler. The development of private land may have a detrimental affect if the land is converted to a use other than forested land.

Existing Condition Permanent openings and old fields, Rights-of-way, Improved pastures

Habitats considered here include permanent openings and old fields, utility rights-of-way, and improved pastures. Other early successional habitats such as early successional forests are discussed elsewhere in this document.

Permanent Openings and Old Fields

Permanent grass/forb and seedling/sapling/shrub habitats are important elements of early successional habitat. Permanent openings typically are maintained for wildlife habitat on an annual or semi-annual basis with the use of cultivation, mowing, or other vegetation management treatments. These openings may contain native grasses and forbs, but many are planted to non-native agricultural species such as clover, orchard grass, winter wheat, annual rye, or other small grains. Old fields are sites that are no longer maintained and or succeeding to forest or are maintained on a less frequent basis (5-10 year intervals, usually with burning and mowing). They are largely influenced by past cultural activities and may be dense sod or a rapidly changing field of annual and perennial herbs, grasses, woody shrubs and tree seedlings.

Permanent openings are used by a variety of wildlife, both game and non-game species. The benefits of permanent openings to white-tailed deer are well documented. Permanent openings, especially those containing grass-clover mixtures, are used most intensively in early spring, but also are an important source of nutritious forage in winter, especially when acorns are in short supply. Forest openings also are a key habitat component for wild turkeys throughout the year. Maintained openings provide nutritious green forage in the winter and early spring and seeds during late summer and fall. Because of the abundance of insects and herbaceous plants produced in these openings they are especially important as brood rearing habitat for young turkeys. Linear openings, especially those associated with young regenerating forests, provide optimal brood habitat conditions for ruffed grouse.

There also are numerous wildlife benefits from openings maintained in native species. Native warm season grasses provide nesting, brood-rearing, and roosting habitat for northern bobwhite and other grassland species of wildlife. Native species are well adapted to local environments and generally require less intensive maintenance following establishment.

Old fields provide food and cover for a variety of wildlife species. A number of disturbance-dependent birds, such as northern bobwhite, grasshopper sparrow, golden-winged warbler, and blue-winged warbler are associated with old field habitat. Recently abandoned fields are important for rabbits and many small mammals. Woodcock use old fields as courtship, feeding, and roosting sites. Although managed less intensively than other types of permanent openings, some degree of periodic management is necessary to maintain these habitats.

There are approximately 1,517 acres of permanent maintained openings on the CNF. This represents 0.2 percent of the total national forest acres. Many were created by the expansion of log landings following timber harvest or by closing and seeding old roads to create linear openings. They are maintained with funding provided by the Tennessee Wildlife Resources Agency (TWRA), the Forest Service, and partners including the National Wild Turkey

Federation (NWTF). Many are planted in non-native grass-clover mixtures, which include combinations of white or red clovers along with wheat, rye, oats, orchard grass, and ryegrass. Some of the older openings are dominated by fescue and/or annual weed species, and some of the recently renovated openings are planted to grain sorghum. Old fields acreage is currently unknown.

The only openland, grassy wildlife openings in the assessment area are approximately 23 miles of linear wildlife openings and 15 acres of spot openings.

Rights-of-Way and Improved Pastures

Although pastureland acreage has declined over the last 50 years, pastures still comprise approximately seven percent of the southeastern U.S.A. For the SAA Area, pastures comprise approximately 17 percent of the area, 99 percent of which is on private land. There are no comparable estimates for rights-of-way (ROW).

Utility ROWs and improved pastures typically are managed for purposes other than to provide wildlife habitat. However, they can provide wildlife benefits if managed appropriately. Rights of-way can be established and maintained in plantings that enhance their benefits to wildlife. Once established, maintenance costs generally are reduced. There are approximately 1,300 acres of powerline ROW on the CNF. Right-of-way acreage was estimated by multiplying the existing 85 miles of powerline ROW known to the CNF by an average width of 125 feet. The majority of these support a mixture of herbaceous plants and shrubs and are maintained by a variety of methods. There are approximately 2.5 miles of utility corridor in the project area.

The conversion of fescue pastures to native warm season grasses improves habitat conditions for northern bobwhite and numerous grassland species. Featured sites are primarily old farms that were in cultivation when acquired by the Forest Service. Native warm season grass plantings have been established at Doc Rogers fields, several tracts along the French Broad River, and along a powerline ROW between the Ocoee and Hiwassee Rivers. Emphasized species include bluestems, Indian grass, switchgrass and native legumes. An experimental native cool season grass planting (Virginia wild rye) has been established along the Nolichucky River. These plantings total approximately 215 acres and were established with funds provided by the Forest Service, TWRA, TVA and several sportmen's organizations including Quail Unlimited.

Direct and Indirect Effects Permanent Openings and Old Fields, Rights-of-Way, Improved Pastures

Alternative A (No Action)

This alternative would not affect the current wildlife openings in the analysis area. It would allow the ROW in the analysis area to grow from its current state of early successional grasses and shrubs into a mid successional stage forest. Invasive species may also spread into the ROW displacing native and other desired vegetation.

Alternative B (Proposed Action)

The proposed action would include approximately 39 acres of wildlife opening maintenance and herbicide use to control woody and invasive species in the ROW. This would benefit many species of wildlife, both game and non-game species. The openings provide an important source of nutritious forage in winter, especially when acorns are in short supply. Forest openings also are a key habitat component for wild turkeys throughout the year. Maintained openings provide

nutritious green forage in the winter and early spring and seeds during late summer and fall. Because of the abundance of insects and herbaceous plants produced in these openings they are especially important as brood rearing habitat for young turkeys. Linear openings, especially those associated with young regenerating forests provide optimal brood habitat conditions for ruffed grouse.

Alternative B includes the use of herbicides to control woody vegetation in the utility corridor. The ROW would remain in a grassy shrubby state containing native grasses and shrubs beneficial to a wide variety of grassland wildlife as well as other wildlife that use early successional habitats. This alternative would benefit this element by favoring native and other desired vegetation.

Cumulative Effects Permanent Openings and old fields, Rights-of way, Improved pastures

Alternative A (No Action)

Prescribed burning near any of the affected areas could provide some of the benefits of openings if the burning frequency is adequate to stimulate grassy vegetation and create small openings. Other past, present and reasonably foreseeable activities (see pgs. 16-17) would have little effect.

Alternative B (Proposed Action)

Prescribed burning near any of the affected areas could provide some of the benefits of openings if the burning frequency is adequate to stimulate grassy vegetation and create small openings.

There would be no net loss or gain or other effect from road maintenance. If road maintenance occurs to access a stand then the road would be replanted after harvest and maintained as a linear wildlife opening again.

Openland habitat, in the form of wildlife openings and rehabilitated roads (linear openings), would be maintained in these alternatives. This habitat type provides year-round forage, soft mast, and an abundance of insects for many species.

ROW maintenance using herbicides would add 10.5 miles of grassy and herbaceous habitat to the area, benefiting species using this element cumulatively. Other past, present and reasonably foreseeable activities (see pgs. 16-17) would have little effect.

Existing Condition Riparian Habitats

Terrestrial riparian habitats encompass the transition area between aquatic systems and upland terrestrial systems. All wetlands (including beaver ponds), as well as margins of varying widths along streams, rivers, lakes, ponds, and reservoirs, are contained within terrestrial riparian habitats. These areas provide a number of critical functions for associated species. Most importantly, they provide rich, moist environments, not often found in upland areas. Riparian terrestrial habitats may serve as corridors for wildlife movement, allowing for daily travel and seasonal migration. The riparian area may serve as a connector of habitats and populations allowing gene flow to occur, thus keeping populations genetically vigorous (RLRMP). Riparian habitats ideally include a mosaic of native plant and animal communities and successional stages, with a predominance of late-successional forests. Late successional riparian forests contain multiple canopy layers that provide a variety of ecological niches, thermal and protective cover, and maintenance of moist conditions. Decadence of older forests provide an abundance of snags and downed wood, which also help retain moisture and provide important habitat substrate

for reptiles, amphibians, small mammals, invertebrates, and mosses and liverworts. The majority of riparian dependent species need or prefer late-successional forest conditions for the diverse structure and the moist, temperature-moderated microclimates they provide.

This section of the Environmental Assessment examines the biological elements of the terrestrial riparian area. The physical elements are addressed in "Water and Soil Resource" discussed later.

Acadian Flycatcher (MIS)

Breeding range of the Acadian flycatcher (*Empidonax virescens)* includes southeastern South Dakota east across southern Great Lakes region to southern New England, south to southern Texas, Gulf Coast, and central Florida, west to central Kansas; in Canada, restricted to southwestern Ontario (NatureServe 2002). The highest nesting densities were in the Cumberland Plateau and in Virginia and West Virginia. Key habitat requirements are moist deciduous forests with a moderate understory, generally near a stream (Hamel 1992). Humid deciduous forest (primarily mature), woodland, shaded ravines, floodplain forest, river swamps, hammocks and cypress bays of south, thickets, second growth, and plantations are used for nesting and breeding. Acadian flycatchers require a high dense canopy and an open understory. These birds tend to be scarce or absent in small forest tracts, unless the tract is near a larger forested area. North American Breeding Bird Survey data indicate a stable population in the Eastern U.S. from 1966-2005, but a declining trend in the Blue Ridge Mountains in the same time period (Sauer et al. 2005).

Direct and Indirect Effects Riparian Habitats

Alternative A (No Action)

This alternative would have no direct or indirect effect to Acadian flycatchers. Habitat conditions would remain relatively stable with the possible exception of natural storm events or wildfire. This alternative would have no short-term or long-term effects.

Alternative B (Proposed Action)

The proposed action would have little to no effect on Acadian flycatchers. This project would comply with the riparian area provisions of the RLRMP. No riparian habitat would be affected. These alternatives are not expected to affect Acadian flycatchers.

Cumulative Effects Riparian Habitats

All Alternatives

Other past, present and reasonably foreseeable activities (see pgs. 16-17) would have little effect.

Prescribed burning near any of the affected areas would not cumulatively affect Acadian flycatchers. These projects would also be in compliance with the RLRMP and thus not be likely to impact Acadian flycatcher habitat. Therefore, there would be no cumulative effects to Acadian flycatchers.

Existing Condition Snags, Dens, and Downed Wood

Large woody debris (including branches, large logs, stumps, and root wads) is an important habitat component both to streams and terrestrial areas. It is important both structurally and as a source of energy. Large snags provide birds with nesting and feeding sites, singing perches, and as lookout posts for predators and prey (USDA 2004a). Bats roost and produce maternity

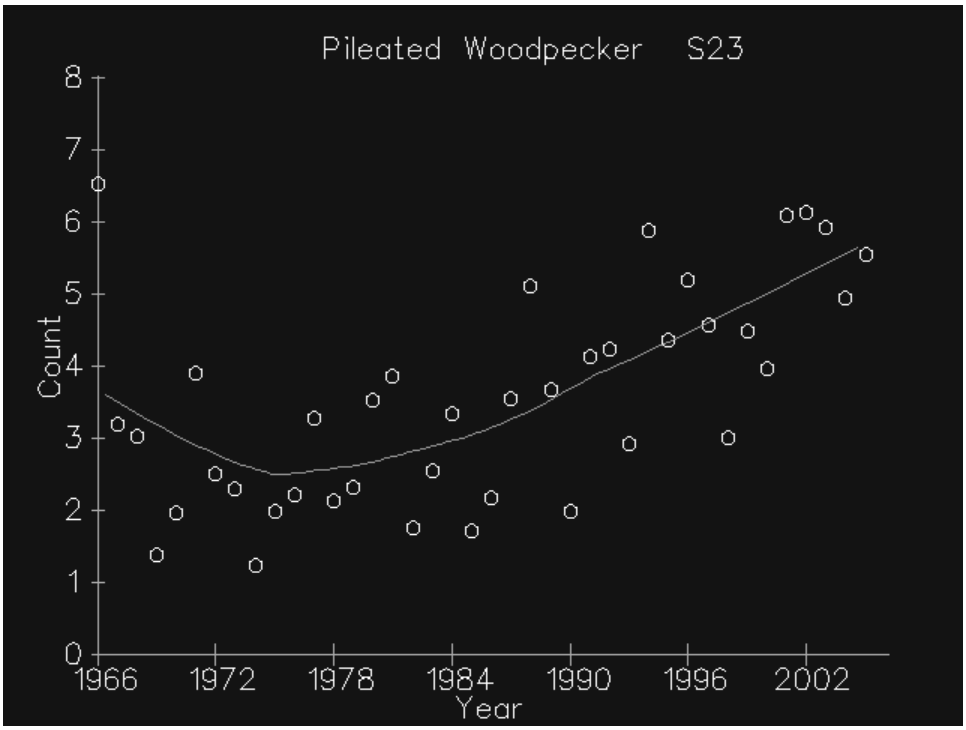
colonies under exfoliating bark. Amphibians, reptiles, small mammals, and invertebrates utilize woody debris as cover. Animals use snags, logs, and stumps as denning sites. Downed wood and logs are used for drumming by grouse to attract mates. Turtles and snakes use logs in streams and overhanging branches for basking and sunning. Large woody debris in riparian areas is used as cover by amphibians, insects, and other invertebrates, and small mammals. Small mammals utilize logs as travel ways. Fungi and other decomposers of woody debris are key components of food webs. Rotting wood tends to absorb moisture during wet periods and release it in dry periods thus helping to maintain a cooler microclimate (USDA 2004a).

Snag availability is currently not considered a limiting factor on the CNF. Snag availability is influenced by a variety of factors including tree species, age, slope, aspect, and health allowing for lots of variability within the landscape. It is estimated that there are about 7 to 8 snags per acre across the forest and the recent SPB outbreak has resulted in a sharp increase in snag availability over the past several years. Unless another disease outbreak occurs, a gradual decline toward pre-SPB outbreak levels should be expected over the next several years as these trees decay and fall to the ground. Snag availability is expected to exhibit a gradually increasing long-term trend as the average age of the forest continues to increase. With the provisions included under all alternatives in the RLRMP, existing snags, downed wood, and den trees would be well maintained on NFS land.

Pileated Woodpecker (MIS)

The pileated woodpecker (*Dryocopus pileatus)* utilizes many forest communities, but generally is limited to mature coniferous, deciduous, and mixed forests with large, dead trees (DeGraaf et al. 1991). Highest densities occur in mixed pine-hardwood sawtimber. It is a locally common permanent resident of Tennessee found in woodlands with trees large enough for nesting and foraging (Nicholson 1997). It can be found throughout the elevational range of the Unaka Mountains but is less common at higher elevations and spruce-fir forests. It is typically considered a forest interior species but will readily fly across openings and is somewhat tolerant of forest fragmentation. Its occurrence in an area is more dependent on regional forested area rather then individual forested tracts. Tennessee Christmas counts show an increase in pileated numbers (Nicholson 1997). See the CNF FY04 Monitoring and Evaluation Report for details of habitat requirements, Cherokee point count data information, and RLRMP Standards and Objectives forest wide (USDA 2005). Figure 7 shows Breeding Bird Survey population trends for Blue Ridge Mountains. The overall regional population trend (Blue Ridge Mountains) for 1966-2005 is a steady increase (Sauer et al. 2005).

Figure 7. Population trends for pileated woodpecker in the Blue Ridge, 1966-2005.



Direct and Indirect Effects Snags, Dens and Downed Wood

Alternative A (No Action)

This alternative would have no effect to snags, dens, and downed wood. The forest would continue to age, causing an increase in those elements. No management activities would take place. There would be no effect to pileated woodpeckers**.**

Alternative B (Proposed Action)

The proposed timber harvests would remove potential snags, dens and downed wood. This would negatively affect species in the area that use those elements due to the loss of nesting sites, dens and escape cover. The effects would be limited to the areas affected by harvest. Due to the recent SPB outbreak, snags are not a limiting factor at this time.

The proposed habitat improvements would negatively impact pileated woodpeckers by removing mature trees the birds might use for nesting and feeding. There is an abundance of this type of habitat found in the surrounding area. The proposed action would remove approximately 390 acres (5% of the analysis area) of forest in the area. The other activities proposed would not affect the woodpecker.

Cumulative Effects Snags, Dens and Downed Wood

All Alternatives

Areas affected by SPB and other areas potentially affected by hemlock woolly adelgid would increase snags, dens and downed wood and would benefit pileated woodpeckers.

Timber sales may also provide snags and downed wood but would also remove some mature trees. Prescribed burning near any of the affected areas would not cumulatively affect pileated woodpeckers. Recreation would not affect this habitat component or the MIS. Private land development may reduce snags, dens and downed wood. Other past, present and reasonably foreseeable activities (see pgs. 16-17) would have little effect.

Existing Condition Aquatic Habitats

All streams in the Greasy Creek analysis area drain to the Ocoee River (5th level Hydrologic Unit Code – 06020003020). The analysis area (National Forest System lands only) contains approximately 92 miles of perennial streams; 19 miles of these perennial streams are capable of supporting fish (Table 13).

Table 13. Aquatic habitats in the Greasy Creek Analysis Area (includes all Forest Service managed streams)

Aquatic Habitats	Project
Ephemeral Streams	332 miles
Intermittent Streams	111 miles
Perennial Streams (no fish)	73 miles
Coldwater Fish Streams	0 miles
Coolwater Fish Streams	19 miles
Warmwater Fish Ponds	7 acres

These streams support cool (19 miles) water fisheries (Table 14) although trout are found in them occasionally. All of the reaches are medium to small having stream orders of 4 to 6; stream order is positively correlated with fish species (Herrig 2004). Gradient varies from a low of 1.2% to a high of 14.8%; gradient is negatively correlated with fish species (Herrig 2004). Elevation (at the lower end of the stream reaches) ranges from 820 to 1,740 feet and is negatively correlated with fish species (Herrig 2004). Generally cold water habitats (capable of supporting trout) occur above 1,200 feet on the Cherokee National Forest. The stream reaches above 1200 feet in this analysis area are all too small to sustain trout.

Table 14. Streams capable of supporting fish in the Greasy Creek Analysis Area on the Ocoee Ranger District.

Stream Name	Reach	Stream Miles	Fishery	Order	% Grad	Low Elev.
MADDEN BRANCH	1	0.4	Cool	4	5.70	840
MADDEN BRANCH	2	0.8	Cool	4	2.50	960
GREASY CREEK	1	2.07	Cool	6	1.20	820
GREASY CREEK	2	1.5	Cool	5	2.50	1080
LONG BRANCH	1	1.34	Cool	4	1.40	960
COON CREEK	1	3.28	Cool	5	1.60	900

Table 14. Streams capable of supporting fish in the Greasy Creek Analysis Area on the Ocoee Ranger District.

CLEAR CREEK	1	1.96	Cool	5	2.10	860
CLEAR CREEK	2	0.92	Cool	5	2.50	1080
CLEAR CREEK	3	1.67	Cool	4	2.90	1200
MCCAMY BRANCH	1	0.8	Cool	4	2.40	1740
MULEPEN BRANCH	1	0.6	Cool	4	4.70	1320
MULEPEN BRANCH	2	0.4	Cool	3	11.00	1460
LAUREL BRANCH	1	0.98	Cool	4	14.80	1180
ROCK CREEK	1	1	Cool	5	3.00	820
ROCK CREEK	2	1.47	Cool	5	8.00	980

Based on the Final Environmental Impact Statement for the Revised Land and Resource Management Plan for the Cherokee National Forest (USDA 2004b) the Ocoee watershed (5th level HUC 06020002030) has an average condition rating for sediment and temperature, and an excellent rating for point source pollution and altered stream flow. An average rating is acceptable for point source pollution, temperature and altered stream flow but is not acceptable for sediment. Greasy Creek has a fish community that appears to lack some species which are intolerant to sediment pollution (banded darter and black redhorse) based on the community species prediction model (Herrig 2004). This model suggests that sediment may be a chronic problem in this stream. Considerable acres of privately owned lands occur upstream of Forest lands. Over grazing and stream bank degradation by livestock are readily apparent on some of these lands.

The streams in the analysis area are relatively unproductive (conductivity/alkalinity levels below 50 ppm) resulting in low aquatic diversity and density. Forest Service, Tennessee Valley Authority, Tennessee Wildlife Resources Agency, University of Tennessee, Auburn University, various contract crews conducted 39 stream surveys (USDA Forest Service 2007) between 1979 and 2007 on streams in the Greasy Creek analysis area. Most streams capable of supporting fish have been surveyed (USDA Forest Service 2007). Four small headwater reaches have never been sampled but are not expected to increase the fish diversity of this analysis area.

Direct and Indirect Effects Aquatic Habitats

Alternative A (No Action)

Alternative A would not involve any ground disturbance or use of herbicides. Sediment accumulation is a problem in this watershed; especially in Greasy Creek. While no new adverse effects would occur to the aquatic environment, the ongoing adverse effects would continue.

Alternative B (Proposed Action)

Alternative B would employ filter strips between ground disturbance and streams (Forest Wide Standards-FW-3, FW-6, FW-7, FW-9, and FW-10; USDA 2004a). Vegetation management within defined riparian corridors would emphasize maintenance of large trees for woody debris recruitment as the desired condition (Riparian Prescription Standards-RX11-1, RX11-8, RX11-29, RX11-30, RX11-31, and RX11-32; USDA 2004a).

Herbicides would be used woody vegetation control along TVA transmission ROW. Forest Wide standards (FW-14, FW-15, and FW-16; USDA 2004a) would be followed during implementation.

Implementation of Alternative B with full consideration of these standards would result in no increase of direct or indirect effects to aquatic habitats or species from these management activities (pgs. 198-199; USDA 2004b). Ongoing sedimentation private lands would continue; however, Forest Service roads would be improved and the amount of sediment reaching streams would decrease.

Cumulative Effects Aquatic Habitats

Alternative A (No Action)

Alternative A does not propose any new ground disturbance. Other activities in the area (see table above) may be contributing sediment to streams. Sediment accumulation is a problem in this watershed; especially in Greasy Creek. Past and present activities in conjunction with Alternative A could continue to have an adverse cumulative effect on the aquatic habitats and species. Activities, on National Forest System lands, that are reasonably foreseeable would be implemented under the standards for protecting streams listed in the Revised Land and Resource Management Plan for the Cherokee National Forest (USDA 2004a). Implemented in conjunction with Alternative A sedimentation could continue to have an adverse cumulative effect on the aquatic habitats and species. Reasonably foreseeable activities that occur on private lands could have a negative effect on the aquatic systems regardless of which alternative is selected; the Forest Service cannot control those actions.

Alternative B (Proposed Action)

Other activities in the area (see pages 16-17) may be contributing sediment to streams. Sediment accumulation is a problem in this watershed. Past and present activities implemented in conjunction with Alternative B could reduce the adverse cumulative effects on the aquatic habitats because the road improvements would control some of the sediment. Activities, on National Forest System lands, that are reasonably foreseeable would be implemented under the standards for protecting streams listed in the Revised Land and Resource Management Plan for the Cherokee National Forest (USDA 2004a). Implemented in conjunction with Alternative B, they would not increase the adverse cumulative effects on the aquatic habitats and species. Reasonably foreseeable activities that occur on private lands could have a negative effect on the aquatic systems regardless of which alternative is selected; the Forest Service cannot control those actions.

Existing Condition Threatened and Endangered Species

Effects to federally-listed threatened and endangered species are analyzed in detail in the Biological Evaluation (Appendix B) for this project. Three federally listed species were analyzed in detail and the results are summarized here.

Direct, Indirect and Cumulative Effects Threatened and Endangered Species

Indiana Bat

No Indiana bats have been found within the project area. Habitat is available. With Alternative A, no activities would take place in habitat for the Indiana bat (*Myotis sodalis)*; therefore, there would be no affect to Indiana bat. The proposed action is consistent with the RLRMP (USDA

2004a). The RLRMP established standards aimed at protecting Indiana bat including provisions for snag retention (FW-34) and prescribed burning (FW-36). Ephemeral pools are being created in part for the benefit of Indiana bats. Alternative B is not likely to adversely affect the *Myotis sodalis*, because the project is consistent with the protective measures for Indiana bat set forth in the RLRMP. The USFWS concurs with this finding (Barclay 2008).

Small Whorled Pogonia

This species was not found during surveys and is only analyzed for prescribed burning effects. Alternative A would have no effect. Dormant burning would have no effects. Growing season burns would restore natural assemblages and likely have long term beneficial effects. Alternative B is not likely to adversely affect the *Isotria medeoloides* The USFWS concurs with this finding (Barclay 2008).

No other Threatened, Endangered or Proposed species that occur on the CNF would be affected. Formal consultation with the USFWS is not required.

Existing Condition Demand Species

Black Bear (MIS)

The black bear (*Ursus americanus*) uses a wide variety of habitats in the southern Appalachians, occurring primarily on national forests and national parks of the Southern Blue Ridge, Northern Cumberland, and Allegheny Mountains and the Northern Ridge and Valley. These public lands in Virginia, West Virginia, North Carolina, Tennessee, and Georgia connect to form a forested landscape of over six million acres where bears are generally distributed at low to medium densities. The increase of older oak forests in this large block of habitat, along with increased protection and conservative hunter harvest, has allowed bear populations throughout the southeastern mountain region to moderately increase over the past 30 years.

Bears generally are absent from the Cumberland Plateau, Southern Cumberland Mountains, Southern Ridge and Valley and Piedmont (SAMAB 1996). Tennessee's black bear population is estimated at 1,000 to 1,500 animals, half of which may occupy the CNF. Bait station survey data and legal harvest data indicate a significant population increase since 1980 (USDA 2004c).

In the southern Appalachians, including the CNF, important habitat elements are habitat remoteness, habitat diversity, den site availability, and availability of hard mast.

Black bears are opportunistic omnivores and consume a variety of seasonal plant and animal foods including flowering plants, grasses, various roots and tubers, and especially soft mast (grapes, berries, apples, etc.). However, availability of hard mast (acorns and hickory nuts) is critical throughout the winter, and reproductive success is closely related to this habitat factor. Total production of hard mast and production by individual trees can fluctuate from year to year due to climatic and other factors (USDA 2004c).

Bears den in a wide variety of sites including road culverts, abandoned buildings, and in vegetation. Traditional dens are found on the ground in caves, rockfalls, or under the root mass of uprooted trees, and in hollow trees. Some researchers have found that hollow trees are preferred dens. Others have found that ground dens are preferred in the North Carolina mountains. Preference may be related to availability and may be a learned behavior (USDA 2004c).

Availability of potential den trees on the CNF is augmented by a forest wide standard requiring their retention during all vegetation management treatments. For this reason, the black bear was

selected as an MIS to help indicate management effects on meeting hunting demand for this species.

Ginseng (MIS)

While not designated as an MIS in the RLRMP, *Panax quinquefolius* (ginseng) is included here due to its status as a species in demand by the public. It is tracked by the number of permits issued. Ginseng is endemic to almost half of the U.S. and over a quarter of North America. It has been reported and documented in 33 states, the District of Columbia, and 2 Canadian provinces. Its range is from southwestern Quebec, southern Ontario, south to Georgia, Alabama, Louisiana, Oklahoma, and Kansas. (Kauffman 2006). Habitat varies somewhat across its range, but is generally described as nutrient rich, mesic hardwood forests (Weakley 2004). Ginseng is previously known from seventy-four sites on the CNF, though there are numerous sites that have not yet been added to the Forest database bringing the current total to well over 100 known sites. Despite high numbers of sites for the species, few populations support more than 50 individuals and most contain only a few scattered plants. This is consistent with range wide trends reported by Kauffman (2006).

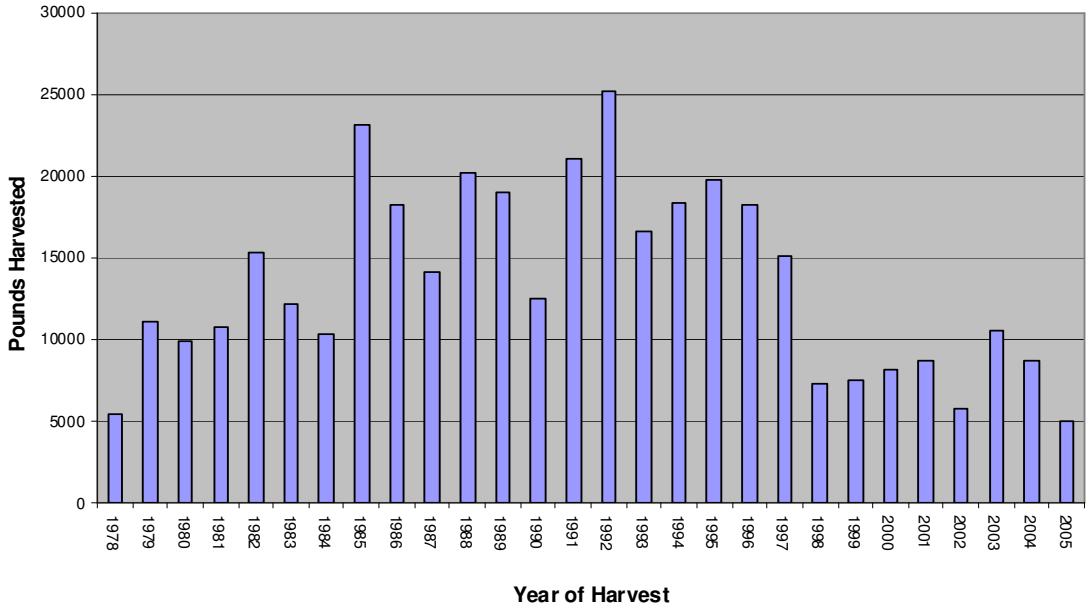
During the botanical surveys, approximately 20 *Panax quinquefolius* plants were found within stand 306/38. This population occurs within a streamside hardwood forest along the primary drainage in the stand and thus would be encompassed by the riparian management prescription. Previously known locations of this species fall under the forest wide prescription allocations shown in Table 15.

Table 15. Prescription allocations of previously known locations of ginseng.

Prescription Allocation	Number of Occurrences
1A – Designated Wilderness	5
4A – Appalachian Trail Corridor	8
7A - Scenic Byway Corridors	2
7B - Scenic Corridors/Sensitive Viewsheds	3
7D - Concentrated Recreation Zone	1
7E2 – Dispersed Recreation Areas	5
8A1- Mixed Successional Habitats	12
8B- Early Successional Habitat Emphasis	2
8C – Black Bear Habitat Management	29
9F – Rare Communities	5
9H – Management, Maintenance, and Restoration of Plant Associations to Their Ecological Potential	2

Within the State of Tennessee, ginseng harvest is regulated through a permit system administered by the Tennessee Department of Environment and Conservation- Division of Natural Heritage. The Tennessee ginseng program arose out of the Ginseng Dealer Registration Act of 1983, and the Ginseng Harvest Season Act of 1985. This program regulates Tennessee's ginseng industry in compliance with the Convention on International Trade in Endangered Species of Wild Fauna and Flora of 1973 (CITES). The Division permits about 50 ginseng dealers annually and certifies the roots for export. The purpose of this program is to monitor the harvest level of wild ginseng to ensure that commercial exploitation does not cause it to become endangered. Statewide harvest data for 1978-2005 is presented in Figure 8.

Figure 8. Statewide Ginseng Harvest Totals (lbs.) 1978-2005



In addition to the state permitting process that is geared at regulating commercial trade in ginseng roots, the CNF further tracks the removal of ginseng from Forest lands through a fee permit system (Table 16). Permits were sold to individuals at a rate of $20 per pound (green weight) from 1999-2005 for ginseng collection.

Table 16. Ginseng Harvest Data Summary for Cherokee National Forest Lands, TN, 1999-2005. (Pounds are wet weight)

Fiscal Year	# Permits	Pounds	Price
1999	41	44	$880
2000	79	79	$1,580
2001	41	67.5	$1,350
2002	78	96	$1920
2003	69	69	$1,380
2004	102	102	$2,040
2005	32	32	$640
2006	16	16	$480

From 1978 to present, statewide ginseng harvests were at their highest from the mid 1980's through the 1990's. While overall ginseng harvest has declined in the state, numbers of permits issued per year on the CNF has fluctuated considerably, but shown a general increase.

Direct and Indirect Effects Demand Species

Alternative A (No Action)

The No Action Alternative would result in a decrease in vegetative age class diversity. Habitat diversity would decrease over time as young timber stands grow out of reach for browsing, soft mast production in early successional areas (including 10.5 miles of utility corridor) declines, and dense escape cover declines. Black bear utilize shrub/sapling stage vegetation to varying degrees, and the RLRMP guidelines require that 4-10% of each compartment in Prescription 9.H be comprised of such habitat (0-10 year age class). Currently, 3% of lands in the analysis area are in the 0-10 year age class.

This alternative allows the increase of white pine and other shade tolerant tree species to become more dominant. Hard mast would continue to decrease as a result.

No other wildlife habitat improvements would take place under Alternative A.

Commercial collection of ginseng roots is listed as the primary factor in the species' decline although impacts from timber harvest activities can also negatively impact the species (Kaufmann 2006). Twenty-three of the previously known seventy-four sites occur within mapped prescription allocations (1A, 4A, 7A, 7B, 9F) that would at least minimize potential negative effects from management at a programmatic level. Many of the sites also fall into the unmapped riparian prescription that would also provide protection. Forest Wide Standard 28 states that individuals needed to maintain viability of a species within the CNF will be protected. The U.S. Fish and Wildlife Service Division of Scientific Authority recently published a "non-detriment" finding for the harvest and export of wild and wild-simulated ginseng roots "provided that exported roots are from plants that were at least 5 years of age or older at the time of harvest." Timber harvest activities affect plants irregardless of age and thus could be detrimental to the species survival. Kauffman (2006) states that anecdotal information suggests that mature individuals are more resistant to canopy removal than young plants and seedlings, however very little published information exists on the impacts of canopy manipulation on ginseng.

The one population found within the Greasy Creek stand 306/38 would be protected by adherence to riparian standards. No further mitigations are proposed.

Under Alternative A, no changes to the existing environment would occur beyond those attributed to natural disturbances. Based upon the above information, implementation of Alternative A would have no effect on the viability of ginseng.

Alternative B (Proposed Action)

The timber harvest in Alternative B increases the percentage of acreage in the 0-10 year age class from 3% to 8% in 2009 for all forested lands. The addition of structural and biological diversity in the form of shrub/sapling vegetation would provide soft mast, insects, forage, and escape cover. Additional cover would be provided by tops and root wads which are left behind. Known black bear den sites would be protected for as long as they remain suitable by prohibiting vegetation management and ground-disturbing activities within a minimum 100 feet around the den. Potential black bear den trees would be retained during all vegetation management treatments. Potential den trees are those that are greater than 20" DBH and are hollow with broken tops.

Openings created by harvest and prescribed burning, would benefit black bear by providing soft mast and cover. Female bears use middle elevations with higher stand richness during summer months (Van Manen personal communication) and the addition of structural and biological diversity in the form of shrub/sapling vegetation would provide soft mast, insects, forage, and escape cover. Burning stimulates the growth of these grassy and shrubby species.

Soft mast-producing species (dogwood, black gum, hawthorn, grapes, serviceberry, etc.) would be retained during vegetation cutting treatments to the extent possible, within constraints of meeting treatment objectives. Soft mast and other forage is a valuable diet supplement to black bears, especially during the months when hard mast is absent and in years when there is a hard mast failure. Those that would grow naturally after harvest, such as blackberries, would provide this. The treatments include removing pine and planting oak in many stands. Oak would be released in some of the harvest areas producing a mixed pine-hardwood or hardwood-pine stand where there is now a pine stand. This would increase hard mast and would benefit bears.

Negative effects would be a temporary increase in human disturbance. Overall use of the area by forest visitors is expected to increase slightly immediately after harvest even though the open road density would decrease. Access by foot, horseback, and mountain bike are likely to increase along newly closed roads. Disturbance disrupts movement patterns affecting feeding and mating. Disruption of these patterns uses essential energy and loss of energy could result in poor health, especially during winter when food is not as available and bears become dormant.

Openland habitat, in the form of wildlife openings and rehabilitated roads (linear openings), would be maintained in these alternatives. The utility corridor would also be maintained in a grassy and shrubby state. This habitat type provides year-round forage, soft mast, and an abundance of insects for many species, and would be a benefit to black bear. Ephemeral pools may serve as a water source, but otherwise would not affect bears.

The use of prescribed fire is designed to restore these plant communities to a more natural species assemblage, and would likely have a long-term beneficial effect on organisms associated with dry-mesic oak forests.

The other actions in Alternative B, including road construction and reconstruction and other activities would not appreciably affect the MIS or the community.

Alternative B would regenerate 390 acres of forest 71+ years of age. Over 9,100 acres (48%) of late successional forest would remain within these compartments.

The proposed action alternative would benefit bears after the initial disturbance while timber is harvested.

Within the stand where ginseng was found, protection to the population would occur through adherence to riparian standards or other resource exclusions. Proposed dormant season fuel reduction burns would not affect riparian or rich cove habitats and thus would have no effect on ginseng. Herbicides may also be used for timber stand improvement in the form of individual tree release. No herbicides would be used in the vicinity of the known population of ginseng. Areas treated may provide potential habitat for ginseng in the future. Based upon the above information, the implementation of Alternative B may affect individuals but would not lead toward a loss of viability for ginseng.

Cumulative Effects Demand Species

Alternative A (No Action)

Past prescribed burns may have reduced the understory immediately after the burn, but it is soon followed by a flush of new growth. That is beneficial to bears. There would be no cumulative effect because burns would take place in different years, so that the understory over a large area would be in different stages of regrowth. Other timber harvests that have taken place are so minimal as to have almost no effect. The SPB outbreak likely benefited the bears when sunlight from the increased canopy openings caused a flush of new and dense undergrowth.

The death of hemlock from hemlock woolly adelgid apparently would not affect this community or bears to any extent, but its effects are not clear. Any development on private land would potentially decrease the availability of habitat for bears. Other past, present and reasonably foreseeable activities (see pages 16-17) would have little effect. There would be little to no cumulative effects to bears from the No Action Alternative.

Ginseng is a widespread species that is under intense pressure from commercial collection. The species has well over 100 populations documented on the forest, though most are small with only scattered individuals. The new location found for this species within the Greasy Creek analysis area occurs within riparian areas and would be protected from timber harvest impacts. The biggest threat to this species survival comes from commercial harvest. The CNF issues permits for harvest in accordance with findings from the U.S. Fish and Wildlife Service Division of Scientific Authority. Based upon this, ginseng would continue to have viable populations on the CNF. No negative cumulative effects are expected.

Alternative B (Proposed Action)

Examination of this cluster of compartments within the context of the surrounding landscape reveals that approximately 3% of the total 28,400 acre cumulative effects analysis area would be considered early successional habitat after cutting in Alternative B. This habitat would provide needed age class diversity and soft mast. Large areas within these compartments would not be harvested, providing the extensive, fairly remote habitat black bear need for mating and feeding. Hard mast production would increase with the planting and release of oaks in the regeneration areas. Harvest of these stands within the analysis area would have a beneficial cumulative effect on black bear when viewed in combination with past, present, and reasonably foreseeable future actions.

Past prescribed burns may have reduced the understory immediately after the burn, but it is soon followed by a flush of new growth. That is beneficial to bears. There would be no cumulative effect because burns would take place in different years, so that the understory over a large area would be in different stages of regrowth. The SPB outbreak likely benefited the bears when sunlight from the increased canopy openings caused a flush of new and dense undergrowth.

The death of hemlock from hemlock woolly adelgid apparently would not affect this community or bears to any extent, but its effects are not clear. Any development on private land would potentially decrease the availability of habitat for bears. Other past, present and reasonably foreseeable activities (see page 19) would have little effect.

Ginseng is a widespread species that is under intense pressure from commercial collection. The species has well over 100 populations documented on the forest, though most are small with only scattered individuals. The new location found for this species within the Greasy Creek analysis

area occurs within riparian areas and would be protected from timber harvest impacts. The biggest threat to this species survival comes from commercial harvest. The CNF issues permits for harvest in accordance with findings from the U.S. Fish and Wildlife Service Division of Scientific Authority. Based upon this, ginseng would continue to have viable populations on the CNF. No negative cumulative effects are expected.

Existing Condition Non-native Invasive Plants and Animals

A multitude of non-native invasive species threaten the integrity of native ecosystems in the southern Appalachian area. These include, but are not limited to, species such as kudzu, privet, Japanese honeysuckle, multiflora rose, and Nepal grass. The SAA (SAMAB 1996) provides a summary of the major threats from non-native invasive plant species.

Although not mentioned in the SAA, the wild boar (*Sus scrofa*) is another example of non-native species that is negatively affecting certain habitats (beech forests and wetlands) in the southern Appalachians (USDA 2004b). Wild boars were introduced into the southern Appalachian Mountains in the early 1900's. Originally imported for hunting, they eventually escaped from their enclosed hunting reserves in North Carolina and over time have become a naturalized component of the area's fauna (USDA 2004b). Management of this species is somewhat controversial in that some hunters desire it as a major game species, yet its impacts to the natural environment must be considered. No major impacts from wild boars were seen within the analysis area and this species will not be analyzed further in this document.

In 1999 the Southern Region released a Noxious Weed Management Strategy that outlined five emphasis areas, 1) Prevention and Education, 2) Control, 3) Inventory, Mapping, and Monitoring, 4) Research, and 5) Administration and Planning. This was followed in 2001 with the development of the Regional Forester's Invasive Exotic Plant Species list. The RLRMP includes numerous Goals, Objectives, and Standards to address the potential impacts of non-native invasive species. These include control efforts and maintenance and restoration of native species.

On the CNF, the following non-native invasive plant species are tracked through project level inventories: Tree of heaven (*Ailanthus altissima*), small carpetgrass (*Arthraxon hispidus*), autumn olive (*Eleagnus umbellata*), English ivy (*Hedera helix*), sericea lespedeza (*Lespedeza cuneata*), privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), Nepal grass (*Microstegium vimineum*), princess tree (*Paulownia tomentosa*), kudzu (*Pueraria lobata*), and multiflora rose (*Rosa multiflora*). While other non-native invasive plant species may occur with scattered distributions on the Forest, these species are recognized as having substantial occurrences with a high potential for impacts to native communities on the Forest.

Within the Greasy Creek analysis area non-native invasive plant species are abundant, yet mostly restricted to roads and trails and other disturbed sites. Nepal grass (*Microstegium vimineum,*) sericea lespedeza (*Lespedeza cuneata*), and Japanese honeysuckle (*Lonicera japonica*) are a particular problem along linear wildlife openings and roads. Nepal grass out-competes other desired vegetation and is often dominant where it occurs. Wildlife do not use Nepal grass, thus the plant is having an adverse effect on wildlife habitat within the analysis area.

Direct and Indirect Effects Non-native Invasive Plants and Animals

All Alternatives

The proposed action does not propose treatments for invasives. Nepal grass, sericea lespedeza, Japanese honeysuckle, and other non-native invasive species could continue to spread though normal processes, further affecting wildlife forage and native and desired non-native plants in the analysis area if untreated. However, noxious weed treatments are taking place due to a separate decision.

Cumulative Effects Non-native Invasive Plants and Animals

All Alternatives

Noxious weed treatments are expected to begin in summer 2009. Herbicides would be used to control non-native invasive plant species in the Greasy Creek affected area and other areas. The action is intended to slow the spread of these species on the landscape. The action would not cumulatively affect other areas or actions.

Existing Condition Viability Concern Species

Effects to Regional Forester Sensitive Species are analyzed in detail in the Biological Evaluation (Appendix B) for this project. These species are those for which there is concern for viability of their populations across their range.

Species known from the area or found during surveys are bald eagle (*Haliaeetus leucocephalus)*, Diana fritillary *(Speyeria diana)*, Tennessee dace *(Phoxinus tennesseensis*), Mountain bush honeysuckle (*Diervilla rivularis*), Fraser's loosestrife (*Lysimachia fraseri*), Nevius' stonecrop (*Sedum nevii*), and Southern nodding trillium (*Trillium rugelii*). These species would be protected from impacts of the proposed action. Some species were not found during surveys but habitat is available within the burn areas.

Table 17 displays species evaluated in the Biological Evaluation and Determinations of Effect for each. Analysis of cumulative effects can be found in the Biological Evaluation.

Table 17. Species Evaluated in the Biological Evaluation and Determinations of Effect

Scientific Name	Determination of Effect-Alternative A	Determination of Effect-Alternative B
Plethodon aureolus	No effect. No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Plethodon teyahalee	No effect. No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Haliaeetus leucocephalus	No effect. No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term and localized
Speyeria diana	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Corynorhinus	No effect: No activities would	May impact individuals, but not

Table 17. Species Evaluated in the Biological Evaluation and Determinations of Effect

rafinesquii	occur; no habitat would be affected.	likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Myotis leibii	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Paravitrea placentula	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability.
Patera archeri	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Vertigo bollesiana	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability.
Vertigo clappi	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability.
Ditrichum ambiguum	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Homaliadelphus sharpie	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Aster georgianus	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Berberis canadensis	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Botrychium jenmanii	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Buckleya distichophylla	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term probably beneficial.
Delphinium exaltatum	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Diervilla rivularis	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Fothergilla major	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term probably beneficial.
Gentiana	No effect: No activities would	May impact individuals but not

Table 17. Species Evaluated in the Biological Evaluation and Determinations of Effect

austromontana	occur; no habitat would be affected.	likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Lysimachia fraseri	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Monotropsis odorata	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Benefit from opening understory, negative impacts are short term.
Penstemon smallii	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Pycnanthemum beadlei	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Sedum nevii	No effect: No activities would occur; no habitat would be affected.	No effect. Known populations protected.
Thaspium pinnatifidum	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Thermopsis mollis var. fraxinifolia	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term probably beneficial.
Trillium rugelii	No effect: No activities would occur; no habitat would be affected.	No effect. Known populations protected.
Tsuga caroliniana	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term probably beneficial.

The implementation of the proposed activities may affect individuals of sensitive species, however, this would not likely lead to a loss in range wide viability or trend toward federal listing.

In addition to Regional Forester Sensitive Species, forest managers have responsibility to maintain occurrences of all native and desired non-native species that are necessary to maintain viable populations of these species on the Forest under RLRMP Forest Wide Standard 28 (FW-28). Appendices E and F to the Final Environmental Impact Statement for the RLRMP (USDA 2004c) lists species of viability concern known to occur on the Forest. Appendix C of this document describes the existing condition and effects by alternative for each species of viability concern that was found in the area.

Existing Condition Forest Health

Forest health concerns for the CNF include insects, diseases, and potential storm damage. Damage to forest communities occurs in varying degrees depending on community types and species composition, location on the landscape, age of the forested community, past disturbance, and weather conditions.

Gypsy Moth

Gypsy moth (*Lymantria dispar*) is a major defoliator of hardwood trees in both forest and urban landscapes. It was introduced from Europe into Massachusetts sometime between 1867 and 1869. Because the favored host, oak, is widespread in the eastern deciduous forests, gypsy moth thrives and continues to expand its range west and south each year. By the 1980's, gypsy moth was established throughout the northeast. Today the area considered generally infested includes parts of Virginia, just north of the CNF. Gypsy moth is projected to occur on the forest between the year 2010 and 2025 (SAMAB 1996). The CNF can anticipate gypsy moth attack on the north end of the forest as early as the year 2010 and for the south end of the forest as early as 2020.

Gypsy moth larvae feed on more than 300 species of trees, shrubs, and vines. Favored hosts include oak, apple, birch, basswood, witch hazel, and willow. Hosts moderately favored include maple, hickory, beech, black cherry, elm, and sassafras. Least favored hosts are ash, yellow poplar, American sycamore, hemlock, pine, spruce, black gum, and black locust. Feeding on less favored host plants usually occurs when high-density larval populations defoliate the favored tree species and move to adjacent, less favored species of trees to finish their development.

Hemlock Woolly Adelgid

Hemlock woolly adelgid (*Adelges tsugae*) (HWA) was introduced into the eastern U.S. from Asia in the early 1950's near Richmond, Virginia. The HWA was present on some exotic tree species that a private collector planted in his arboretum. The distribution of the HWA remained localized until the 1960's. The population has since spread throughout the Shenandoah Valley into the Blue Ridge Mountains of Virginia, North Carolina, South Carolina, Tennessee, Georgia and the northeastern U.S. The entire range of eastern hemlock is threatened and could be infested within 30 years. Infestation by the HWA has been detected on the north end of the CNF. There are also well-established populations in North Carolina and the Great Smoky Mountains National Park adjacent too much of the CNF. Recently, the adelgid has been found in several locations on the Ocoee/Hiwassee Ranger District. The CNF can expect to see much of its hemlock infested in the near future.

Impacts to the host species *Tsuga canadensis* and *T. caroliniana,* eastern and Carolina hemlocks, respectively, are severe. Once infested, tree mortality usually occurs in two to five years. Mortality is not restricted to any size or age of hemlock. This insect pest threatens the hemlock resource and also threatens the unique ecosystem it helps comprise. Hemlock provides habitat for a variety of plants and animals and helps to maintain stream temperatures for a variety of aquatic species.

Southern Pine Beetle (SPB)

The SPB (*Dendroctonus frontalis*) is the most destructive pine bark beetle in Tennessee and the southern U.S. (USDA 2004). Pine trees are killed singly, in small groups, or in large numbers, sometimes exceeding hundreds of acres. The SPB is a native pest to the South and occurs in small numbers (endemic) until outbreak or epidemic population levels develop. Infestations can

develop into outbreak levels when pine forests are stressed by crowded growing conditions, trees are damaged from ice or wind, during drought conditions, or when stands are considered biologically mature. These stress conditions can often prevent the tree from producing adequate resin flow to "pitch out" the attacking insect, which is the tree's main defense in a SPB attack. Once pine stands are weakened, they become more susceptible to attack by SPB. Once populations develop in weakened trees, the beetles may spread to healthy trees that normally would resist attack. When beetle populations become large (epidemic), they can successfully attack healthy, vigorous trees and result in widespread mortality. Natural enemies, including diseases, parasites, and predators (primarily the clerid beetle) can help maintain beetle populations at endemic levels. However, these forces seem to have relatively little effect during the early stages of an epidemic when SPB populations explode faster than parasite and predator populations respond to the availability of new host beetle levels. Ultimately, however, these biocontrol agents catch up with and actually exceed the abundant host beetles (food source) and contribute to the collapse of the epidemic. Most major outbreaks last three to five years and occur in irregular cycles of about seven to ten years, sometimes longer in the mountain region.

The SPB attacks all species of pines including white pine, but prefers loblolly, shortleaf, Virginia, and pitch pines all of which are native to the CNF. Pine is a significant component of the forested communities on the CNF and represents a large portion of the CNF.

Storm Damage

Storm damage to trees from tornadoes, hurricanes, snow or ice loading with or without wind, is similar. These stresses cause hardwoods and pines to break off, split, be root sprung, bend and suffer branch and foliage losses. Stresses appear to be much the same, regardless of storm type. Tree crown configuration; age (old, large trees suffer greater damage); size and limberness of stems; branching habit; lean of bole; anchorage based on rooting characteristics and soil; and the presence of root and stem diseases have as much or more to do with tree damage as the intensity of the storm itself.

Elevation can be important in the case of ice and snow damage. Frequently, a variation of one or two degrees in air temperature can result in bands of varying damage on the same hillside at different elevations, depending on the temperatures there at the time of precipitation. However, even here, pre-storm management to minimize damage is not possible because of the natural randomness of weather patterns.

Direct and Indirect Effects Forest Health

Alternative A (No Action)

No action would result in no immediate change in the existing vegetation. If no regeneration occurs, the present species composition of the forest would eventually shift from the current overstory of predominately shade-intolerant species to that of shade-tolerant species. Shade intolerant species such as shortleaf pine, Virginia pine, scarlet oak, black oak, yellow poplar would decrease in abundance. Shade tolerant species such as red maple, black gum, white pine and hemlock would increase in abundance. The assemblage of understory plants would change following the succession of the forest canopy composition.

The long-term effect of no action would be an older, more uniform forest where species composition, age-class distribution, and understory vegetation would continue to change relatively slowly by processes of natural succession.

This alternative would not provide further age-class diversity with the addition of early-successional habitat through timber harvest and regeneration. Barring a major natural disturbance, plant communities favoring oak or shortleaf pine would be replaced under this alternative by the shade-tolerant species currently in the understory. There would be a higher proportional amount of acres in the 70+ age classes which would further imbalance the age-class distribution.

This gradual shift of shade-intolerant species to that of shade-tolerant species would result in a reduction of some important wildlife elements such as hard and soft mast production, which would decline as the percentage of mature scarlet, black, chestnut and white oak trees declined. Soft mast would also be reduced due to the loss of early-successional habitat.

As the trees grow older, there would be an increased vulnerability to insect and disease, which would result in trees with slower growth and decreased vigor. The Gypsy Moth poses real threats to oaks and hardwood stands in general. The SPB, which was noted as a threat to stands of white and yellow pine in the analysis area, has killed some nearly pure pine stands as well as many scattered pine. Hardwood stands of advanced age may be vulnerable to oak decline.

The older trees in the analysis area would eventually die as natural processes along with insect and disease impacts continue. Woody debris in the form of large trees and limb wood may increase on the forest floor as older trees and suppressed trees finally die and fall.

HWA poses a serious threat to the eastern hemlock found in the analysis area. The CNF HWA Suppression EA and DN (USDA 2005b) includes one hemlock treatment areas within the Greasy Creek analysis area; located near Presswood Gap. This area will be treated in the next few years using biological and chemical control methods. The site was chosen for treatment as part of a landscape level effort to maintain the presence and genetic diversity of hemlock. The treatment site was chosen in coordination with other treatment sites on the landscape so that pollen may be transferred between sites.

There are 22 stands (282 acres) of SPB killed pine in the analysis area scheduled for restoration under previous decisions (CNF 2004 and 2005). This treatment consists of site preparation followed by planting shortleaf pine. The area being treated is considered to be in regeneration and is accounted for in the age class distribution for all alternatives.

White pine, and to a lesser degree eastern hemlock, have benefited from the absence of wildland fire in the analysis area. These species are best suited to occupy lower slope and riparian habitats and do not become established in areas that have periodic fire. Due to the lack of fire in the analysis area, they have seeded in on many upland sites.

No action would result in no immediate change in the existing vegetation. The long-term effect of no action would be an older, more uniform forest where species composition, age-class distribution, and understory vegetation would continue to change relatively slowly by processes of natural succession.

Alternative B (Proposed Action)

Table 18 indicates the age class distribution for the Greasy Creek analysis area after the proposed harvest activities would occur. These harvest activities would occur in the 9.H MP areas of compartments 301, 302, 303, 304, 305, 306, 357, 375 which have about 8,222 acres within the analysis area. The acreage in older successional stages and associated vegetation would decrease by 390 acres or 5% within these compartments in Alternative B. The regeneration proposed in

Alternative B (approximately 5%), combined with the existing 0-10 year old forest (approximately 4%), totals about 9%.

Implementing this alternative over the long-term would lead to a more balanced forest-wide age-class distribution and improve the health and vigor of individual stands through harvesting. The base year for the table is 2009.

Table 18. Age Class Distribution for the Greasy Creek Analysis Area

Age	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101+	Total
Alt A	4	7	13	6	8	0	4	16	28	12	2	100
Alt B	9	7	13	6	8	0	3	15	25	12	2	100

The definition of Basal Area is useful for the narrative that follows. Basal area is the cross sectional area of a tree measured at 4.5 feet above the ground. Basal area per acre is the sum of all individual tree basal areas on an acre which is used as a measure of stand density.

Seedtree with reserves (287 acres) stands 301/24, 301/27, 304/24, 304/25, 305/04, 306/03, 306/32, 306/35, 306/38, 375/08, and 375/22 This regeneration method would leave 10 to 20 BA/AC (Basal Area per acre) of well spaced shortleaf pine seed trees where possible. All den trees would be left as well as some mast producing trees in order to make up the leave basal area. Most if not all of the trees left with this regeneration method would remain in the stand through the next stand rotation. This method produces a two-aged stand.

The seedtree with reserves method is similar to the shelterwood with reserves method in that residual trees are left after regeneration. For the purpose of this analysis they are similar in effect. In general, seedtree with reserves method is used to establish pine dominated stands, the shelterwood with reserves method is used to establish oak dominated stands.

Seedtrees which are left, produce seed for the regeneration of the next stand. Natural regeneration of shortleaf pine can be unpredictable and planting these species is necessary to ensure adequate stocking. The seedtree method allows enough sunlight to reach the forest floor to facilitate both the artificial and natural regeneration of shade intolerant species such as shortleaf pine and the oaks. The seed tree with reserves regeneration method would produce a mixed stand of shortleaf pine, mixed with Virginia pine, scarlet oak, black oak, white oak, and other hardwood species.

Stands 304/24, 304/25, 305/04, 306/03,306/35, 306/38, and 375/08 are prescribed for seedtree with reserves regeneration (200 acres) and would be planted with shortleaf pine at a rate of 100 trees per acre. Stand 306/32 (40 acres) would be spot planted. These stands are suitable pine sites that currently have a component of shortleaf, white, and Virginia pines.

These stands when regenerated, typically produce upward of 800 seedlings per acre of natural regeneration from seed and sprout origin. This natural regeneration includes the oak species, red maple, black gum, Virginia pine, shortleaf pine, the hickories, sourwood and others. Planting the shortleaf pine at a low rate per acre ensures the presence of this species as a stand component, along with a diverse mix of naturally occurring regeneration.

Stands 301/24, 301/27, and 375/22 are prescribed for seedtree with reserves regeneration (47 acres) and would be planted with 300 shortleaf pine per acre in order to achieve stocking of

desirable species. These stands currently have a high concentration of Virginia pine and they are not expected to produce as much desirable, natural regeneration.

Restoration would be monitored in the short term with first and third year survival checks on the planted pine as well as qualitative, informal examination. These stands would be reexamined in the following decades as they develop into maturity and are considered for future treatment.

Shelterwood with reserves (83 acres) stands 303/05, 357/40 and 357/41 These stands would be harvested with enough trees left in the individual stands to maintain approximately 20 to 40 BA/AC as a residual stand. The purpose of the leave trees is to provide a limited amount of shelter for the development of the new stand. Leave trees would be selected to approximate the species composition of the uncut stand. Most if not all of the trees left with this regeneration method would remain in the stand through the next stand rotation. This method produces a two-aged stand.

The stands prescribed for shelterwood with reserves (83 acres) would be regenerated naturally without the aid of planting. These hardwood stands have a substantial oak component and would regenerate well naturally on this site. This method would produce diverse stands that are predominantly hardwood.

Restoration would be monitored in the short term generally with qualitative, informal examination. These stands would be reexamined in the following decades as they develop into maturity and are considered for future treatment.

Clearcut with reserves (20 acres) stand 302/21 This stand is prescribed for clearcut with reserves regeneration. This stand is composed of greater than 70% Virginia pine and does not contain enough suitable reserve trees to reproduce a fully stocked stand of desirable tree species. As much as 10 BA/AC would be left behind for the residual stand. The reserve trees would be trees of value to wildlife such as den trees and mast producers. Stand 302/21 would be artificially regenerated by planting 300 trees per acre of shortleaf pine to achieve desirable stocking levels.

The use of clearcutting as a regeneration method must be shown to be the optimal method for meeting RLRMP management direction [USC 1604 (g) (3) (F) (i)]. Evaluating the optimality of clearcutting (in this case, clear cutting with reserves) involves the evaluation of site-specific ecological and biological factors. These factors must be screened against the RLRMP MP direction to ensure that the regeneration method is truly optimal. The following factors give compelling reasons to consider the use of clearcutting with reserves for this project:

Stand 302/21 is composed of greater than 70% Virginia pine and does not contain enough suitable reserve trees to reproduce a fully stocked stand of desirable tree species. Virginia pine tends to be shallow rooted and vulnerable to wind throw, which makes other regeneration methods problematic. This is especially true in older stands of Virginia pine.

The use of the clearcutting with reserves method for regenerating shade intolerant species such as yellow pine is discussed in the RLRMP (pg. 395). Site preparation, planting and release would ensure the establishment of shortleaf pine in this stand and contribute to RLRMP Objective 17.03.

Based upon the above considerations, the use of clearcutting is the optimal regeneration method for the stands included in the proposed action for meeting RLRMP goals and objectives.

With shelterwood, seedtree, and clearcutting some residual trees would be damaged during the felling and skidding operations. Most damage would not be severe and most trees would recover

quickly from these mechanical injuries. Open wounds are an entry point for insects and disease, and some trees may die as a result. The residual trees are more vulnerable to wind throw and ice damage, and some trees may be lost to these causes.

Site Preparation, manual with burning (350 acres) stands 301/24, 301/27, 302/21, 304/24, 304/25, 305/04, 306/03, 306/32, 306/35, 306/38, 357/40, 357/41, 375/08, and 375/22 This treatment consist of cutting residual stems not wanted for the residual stand, followed by prescribed burning. A manual site preparation and site prep burn would be done in those stands regenerated by the seedtree with reserves method. This treatment would be conducted to accomplish several goals. It would help to clear the area and ease the planting operations, and it would help to control competing vegetation until seedlings become established. Burning also releases nutrients that benefit the growth and development of seedlings. Oak species sprout and grow well after fire and they would contribute to the stocking of the new stands. Some residual trees would be injured or killed.

Site Preparation, manual (40 acres, stand 303/05) A manual site preparation treatment would occur in this stand after harvesting by the shelterwood with reserves method. This treatment consists of cutting down the residual trees not needed for the leave tree component. Most of the trees cut in this treatment are the smaller intermediate and suppressed trees, which often do not develop into dominant and co dominant trees. This treatment is needed to reduce low level shade. Low level shade restricts the establishment of pine and oak, which need the sunlight and growing space.

This stand is on a more of a moist site with a large composition of white pine and white oak. Manual site preparation would provide the desired conditions for regeneration without prescribed burning.

Site Preparation, burning (39 acres, 357/16) This is a stand where the majority of the pine species within it killed by southern pine beetle. The remaining stand has a good composition of well spaced oak. A site prep burn would help break down the large woody debris left over from the beetle kill and prepare a good seed bed to help restore this into a good stand of oak.

Seedling Release, chemical (390 acres) Chemical release would be used in all the regenerated stands, both the natural regeneration as well as the planted stands. The release treatment would give a competitive advantage to the planted seedlings in the newly regenerated stands. When forest stands are regenerated, there would be a naturally occurring flush of new growth. This is more pronounced on the higher quality sites. These new sapling stands contain large amounts of red maple, sourwood, black gum, and other species. Usually small amounts of shortleaf pine regenerate naturally, and more are planted to ensure a well-stocked stand. The release treatment using the herbicide triclopyr would give these desirable species a competitive advantage at a critical time in their development.

Release treatments with herbicides are highly effective for improving the growth and survival of seedlings. Chemical release can make the difference between successful or unsuccessful planting. A single herbicide release treatment is as effective as repeated treatments without herbicides in most cases. Delays in treatment result in a reduction of survival and growth of desirable species.

Release treatments, as well as tree planting, are tools for shaping the species composition of a young stand. These tools would be used to increase the proportion of shortleaf pine and naturally regenerated oak in the stands. Natural regeneration would still provide an important

part of the future stand. No tree species would be eliminated from regenerated stands from the use of release treatments.

Triclopyr would be applied using the thinline method. Thinline is spraying a fine stream of herbicide solution from a hand held sprayer, onto the lower stem of a targeted sapling. The thinline method would be used to open a three to five foot radius around the planted northern red and shortleaf pine seedlings. Saplings treated by this method generally die or are stunted to the point that they are no longer competitive. Because the herbicide can be applied directly to targeted stems, very little overspray occurs. The thinline treatment would be applied in the second year after seedlings are planted.

Wildlife Habitat Improvement (5,600 linear feet) There is a 10.5 mile section of TVA transmission line in which 5,600 linear feet runs through the Greasy Creek project area, leaving about 8 miles outside of the project area. Within this mileage of this line chemical methods would be used to establish desired native grasses and forbs. Some areas may be planted following the herbicide application with desired seed mixtures according to site characteristics.

Prescribed Burning (4,250 acres) Dormant season prescribed burning would be done on 4,250 acres that is predominantly shortleaf pine, oak and mixed oak/pine. This type of low intensity burning would reduce the amount of white pine regeneration in the understory. Small hardwood stems in the understory would likely be top killed and then resprout. This type of prescribed burning would likely benefit the development of advanced oak regeneration. The total amount of prescribed burning would be implemented over a period of several years.

Alternative B would establish 9% of the forested acres in the 0-10 age class thereby falling within 4-10% percent range prescribed in the 9.H prescription. This alternative provides an amount of managed disturbance that would help improve overall vegetative diversity to the area.

Alternative B would regenerate 390 acres of forest land by 2- aged methods in this project entry. If projects regenerating this amount of forest land were implemented every 10 years, the average stand rotation would be 210 years.

Alternative B would decrease the risk of oak decline, SPB outbreak and gypsy moth infestation by promoting vigorous stands and diversifying age class. Although, these forest health concerns would not be eliminated with Alternative B. Some stand age related health problems are likely to occur due to the long average stand rotation. In addition, Alternative B would improve soft mast production.

Alternative B contributes to RLRMP objectives for the restoration of oak or oak pine forest (17.02), restores shortleaf pine (17.03), contributes to the reduction of Virginia pine and restoration of fire adapted pine or oak communities (17.05), promotes the health of susceptible forest communities by maintaining basal area (18.02), and the creation of early successional habitat for prescription area 9.H (9.H-1.01).

Cumulative Effects Forest Health

The area considered for vegetative cumulative effects is all forested acres in the analysis area along with adjacent compartments 150, 151, 152, 154, 155, 156, 157, 173, 174, 175, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 314, 357, 358, and 375 which is an area of 28,473 acres of NFS land.

Alternative A (No Action)

In the short term, Alternative A would have its greatest effect on the 0-10 age class. In the year 2009 only 1 percent of the suitable forested acres in the 0-10 age class (See Table 19). This limits the amount of soft mast and low cover for wildlife. In the long term, this alternative would create an older, more uniform forest, which would be more susceptible to oak decline, gypsy moth, HWA and SPB.

Oak decline, gypsy moth, HWA and SPB would affect the forest structure and composition. Oak decline and the gypsy moth could affect the analysis area due to the large amounts of mature oak. Approximately 33 percent of the analysis area classified as primarily oak and oak pine forest types is over the age of 70. The effect would be a decline in the number of oaks and its associated hard mast.

The SPB outbreak (1999 through 2002) has impacted the analysis area and the surrounding landscape. Approximately 458 acres of SPB impacted area are planned for restoration under another decision document (CNF 2004 and 2005). Approximately 40 percent of the analysis area is pine or pine hardwood forest types over the age of 60 and highly vulnerable to SPB. The probability of another SPB outbreak is high, and would result in a further reduction of pine species.

Hemlock is a major forest component on approximately 4 percent of the analysis area, and a minor but important component over much more area. Nearly all of these stands are older than 60 years. Hemlock woolly adelgid is likely to kill most of the hemlock. Their position in the forest canopy is likely to be replaced by white pine and yellow poplar.

Alternative A does not respond to the prescription area 9.H objective of providing 4 to 10 percent of the analysis area in the 0-10 age class for early successional wildlife species. Alternative A does not provide measures to improve forest health and reduce forest susceptibility to disease and pest outbreaks.

Alternative B (Proposed Action)

See Table 19 for the age class distribution in the previously mentioned compartments, in the various age classes (base year 2009) for all alternatives.

Table 19. Age Class Distribution Percentages for Cumulative Effects

Age	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101+	Total
Alt A	1	5	11	9	4	0	3	11	29	18	9	100
Alt B	3	5	11	9	4	0	3	10	28	18	9	100

Alternative B would increase the amount of 0-10 year old habitat from 1 to 3 percent in the larger cumulative effects analysis area. The above table indicates that there is currently very little early successional habitat (0-10 year old). The majority of the area (68 %) would still be in the 71+-age class. Timber harvesting in the last forty years has begun to establish a more balanced distribution of age classes and the proposed action contributes to this. There are no other reasonably foreseeable activities in the analysis area for the next 5-10 years that would alter the age class distribution.

Chemical release of planted seedlings would occur on 390 acres using the herbicide triclopyr. Small amounts of insecticide imidacloprid may be used on one site in the analysis area for the suppression of HWA (USDA 2005b). This insecticide may be applied by soil injection to as many as 60 hemlock trees in the one treatment area. Herbicides would be used on 10.5 miles of TVA transmission line to establish desired vegetation. The cumulative use of these chemicals would not adversely affect desirable, non target tree species. The total applications of these chemicals would stay within the allowable amounts stated in the Vegetation Management EIS for the Appalachian Mountains (USDA 1989).

The prescribed burning (4,250 acres) would take place over several years and would not have adverse cumulative effects.

The stands proposed for harvests were evaluated as to the possibility of them being identified as existing old growth. This process followed the *Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region* (USDA 1997). None of the stands were found to qualify as existing old growth.

Alternative B would reduce the risk of oak decline, gypsy moth, and SPB at the landscape level. Regeneration harvest diversifies the age class distribution and promotes the development of younger, healthy stands. HWA control measures from previous decisions may have positive effects for preserving hemlock.

Summary of Alternatives

The following table (Table 20) provides a comparison of the alternatives with regard to Biological Elements.

Table 20. Summary of Alternatives for Biological Elements

Biological Element	Alternative A	Alternative B
Mesic Deciduous Forest	No effect	Benefit some species. Temporarily negatively affect individual MIS.
Eastern Hemlock and White Pine Forest	No effect	Benefit many species.
Oak and Oak-pine Forest	No effect	Positive effect to many species. Both positive and negative effects to MIS.
Pine and pine-oak forest	No effect	Benefit many species. No effect to MIS.
Woodlands, Savannas, and Grasslands	No effect	Short term negative effect to some species. Benefit many species, including viability concern.
Successional habitats	No effect	Benefit many species, including MIS.
Permanent openings and old fields, rights-of-way, improved pastures	No effect	Benefit many species, including MIS.
Riparian habitats	No effect	No effect
Snags, dens and downed wood	No effect	Minor reduction in available habitat
Aquatic habitats	No effect	No effect
Threatened and Endangered Species	No effect	Not likely to adversely affect.

Table 20. Summary of Alternatives for Biological Elements

Biological Element	Alternative A	Alternative B
Demand species	No effect	Benefit many species including MIS.
Invasive non-native plants and animals	No effect	Controls existing non native populations.
Species Viability	No effect	May impact individuals.
Forest health	Increased vulnerability to insect and disease,	Improve the health and vigor

Social/Economic Factors

Existing Condition Scenery and Recreation Resources

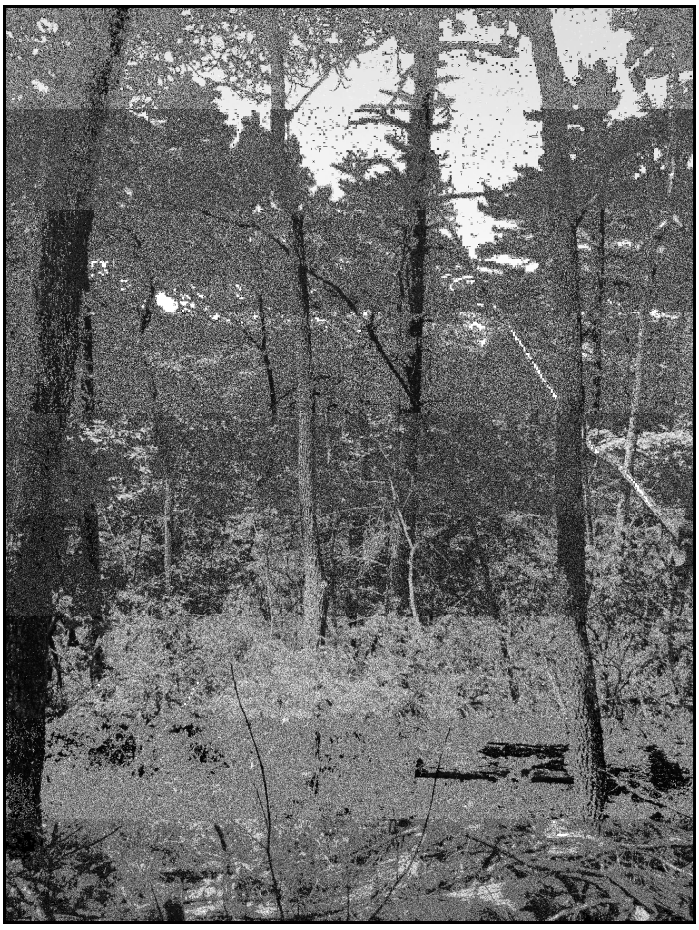
Visitors come to the Cherokee National Forest to experience a wide variety of nature-based recreation activities. The Greasy Creek analysis area is located within the Ocoee River recreation zone, an area of the forest featuring opportunities for sightseeing, whitewater adventure, camping, and mountain biking. These recreation opportunities draw visitation from local and non-local populations including Chattanooga, TN and Atlanta, GA. Hunting, fishing, and driving backcountry roads are examples of other activities that occur within the area, but primarily by local visitors.

During the RLRMP planning process the inventory of forest scenery was updated to reflect the increased interest in the quality of scenery and recreation settings. Forest landscapes like those in the photo above were inventoried based on viewing distance, concern level and scenic attractiveness. This resulted in the assignment of scenic classes using the Scenery Management System (USDA 1995a). In the RLRMP, management prescriptions specify a Scenic Integrity Objective (SIO) for each scenic class.

The SIOs specified for the Greasy Creek analysis area include low, moderate, high and very high. Only areas assigned low or moderate SIOs would be affected by proposed timber harvest activities. Areas assigned high or very high SIOs such as sensitive views from the Ocoee Scenic Byway, Chilhowee Recreation Area and Rock Creek Gorge Scenic Area would only be affected by prescribed burns, no timber harvesting.

Direct and Indirect Effects on Scenery and Recreation Resources

"Scenic Integrity is a measure of the degree to which a landscape is visually perceived to be 'complete.' The highest scenic integrity ratings are given to those landscapes that have little or no deviation from the character valued by constituents for its aesthetic appeal. Human alterations can sometimes raise or maintain integrity. More often it is lowered depending on the degree of deviation from the character valued for its aesthetic appeal" (USDA 1995a).



Scenery viewed in the Greasy Creek analysis area is primarily characterized by pine-oak communities. Consequently, dead, dying and down pine trees are a frequent component of this dynamic landscape as shown in the photo to the left.

The Southern Pine Beetle (SPB) altered the appearance of the affected environment on a large scale from 1999 to 2002. In 2008 the effects are still easily viewed from the Ocoee Scenic Byway, bike trails, Chilhowee Recreation Area and other areas that receive recreational use.

The large scale of the impacts required management efforts to focus on felling hazardous standing dead trees and clearing fallen trees from blocked travel routes versus cleaning up woody debris to improve the aesthetic appeal of the affected landscapes.

Alternative A (No Action)

Under the No Action Alternative the existing appearance of the affected environment would continue to change over time. Dead, dying and fallen pine trees would continue to be a noticeable in the landscape as viewed from forest roads, trails and recreation areas.

Routine trail maintenance activities would continue to clear fallen trees from trail treads or fall hazard trees within travel corridors. The photo of Rim Rock Trail #77 on the left illustrates a typical scene.

The majority of this debris would remain visible until it decomposes to a point that it would no longer be as noticeable or screened by growing vegetation.

Scenic vistas to surrounding mountains would continue to open up and close as pine stands cycle through their successional stages from saplings to mature trees.

The TVA transmission line as it currently appears would continue to look generally the same as in the photo to the left.

Overall, the assigned scenic integrity objectives within the Greasy Creek analysis area would be met under the no action alternative. The natural appearance of the affected pine and oak communities would continue to include a noticeable component of downed, woody debris at a scale that could detract from its aesthetic appeal.

Alternative B (Proposed Action)

The potential direct and indirect effects to scenery and recreation resources from proposed timber harvesting would be limited to areas of the national forest with low to moderate levels of visibility, concern and scenic attractiveness. Tables in the proposed action disclose which compartment/stands have low and/or moderate Scenic Integrity Objectives. Noted travel ways that support the assignment of moderate SIOs are also disclosed. Of the fifteen stands proposed for silvicultural treatments, nine have a low SIO and four have a combination of low and moderate SIOs and two have a moderate SIO.

After implementation of the proposed silvicultural treatments including seedtree, shelterwood and clearcut with reserves, the affected areas with a low SIO would appear very open to visitors in contrast to untreated areas. A person viewing the affected area would typically see residual trees with an open canopy mixed with smaller pines and hardwoods, shrubs, and grasses. Proposed "reserves" would include trees with varied diameters and viewed in clumps or buffer strips based on site conditions.

The photo above illustrates an area after a seedtree harvest with reserves. This scene would be within the acceptable range of effects in areas assigned a low SIO.

In areas assigned a moderate SIO, the design criteria as described in the proposed action would support the retention of a vegetation buffer within the immediate foreground (300 feet from the edge of the affected travel route).

In the Greasy Creek analysis area the retention of buffers may be employed along Forest Development Roads 77 (Oswald Dome Road) and 185 (Clear Creek Road) as well as sections of the Chilhowee mountain bike trail system - Rim Rock Trail #77 and Clear Creek Trail #79.

The buffers, if needed, could retain up to an average of 35 square feet of basal area per acre to reduce the visual contrasts of harvested versus unharvested areas, temporary roads, skid trails and log landings. The amount of vegetation and retention of large diameter trees would vary based on existing vegetation. The buffer of small diameter trees in the photo above represents approximately 50 square feet of basal area. These types of buffers would be expected to achieve the assigned moderate SIOs in areas proposed for silvicultural treatments.

In general, visitors to remote parts of the forest where these activities are proposed could notice areas of trees with decreased canopy cover; increased sunlight; increased visibility into the forest; damaged living vegetation from logging activities; and visible debris, stumps, and root wads on the ground. Slash would be limited to approximately four feet high off the ground in areas with an assigned moderate SIO and visible from noted travel ways. Skid trails and temporary roads would also be noticeable and possibly appear as potential trail opportunities if using the Rim Rock and Clear Creek trails. Rehabilitation of these areas would help keep users on designated trails. Visitors may experience temporary trail closures and limited access during logging operations for safety reasons.

After the harvest, the effects of manual site preparation and the use of chemicals to promote desired tree species would be visible. These activities would produce additional downed woody debris; some scorched trees from burning and decreased stand densities.

Forest growth after the initial treatment would naturally decrease noticeable effects of management activities. As shown in the photo to the left, grasses would begin to diminish the visual impacts of slash, downed trees and skid trails within a year after treatment. Over five years, saplings would provide additional screening.

The photo to the left represents the openness of a stand after a clearcut with reserves during the leaf off season. Impacts to scenery would be reduced during leaf on seasons.

Proposed activities implemented to meet design criteria as stated in the proposed action would meet the SIOs assigned to affected areas.

The TVA transmission line would appear similar to the existing condition, but with different ground cover and increased opportunities to view wildlife. No change in appearance would be expected except during the transition of vegetation types due to the use of herbicides.

Proposed fuels reduction burns would decrease on-the-ground woody debris, provide wildlife habitat and enhance wildlife viewing opportunities. Initially the scorched ground and trees would be noticeable especially where open roads function as fire lines. Impacts would be most noticeable immediately after the burn in February/March until leaves appear in April and May. However, effects would diminish after a season of leaf litter and weathering. Visitors would expect to see impacts near the Chilhowee Recreation Area in the same areas that have previously been treated as part of the Seed Orchard prescribed burn. Those traveling State Highway 30 and US Highway 64 would also notice impacts viewed before as part of the Madden Branch prescribed burn. Affected areas of the Presswood and Coon Creek prescribed burns would not be viewed from areas with high recreational use.

Cumulative Effects Scenery and Recreation Resources

Alternative A (No Action)

The SPB outbreak that occurred from 1999 to 2002 impacted the scenic integrity and recreation opportunities across the CNF, especially the south end of the forest including the Greasy Creek analysis area. The consequent dead and dying pine trees have either been removed or allowed to fall and remain on the ground. Many of these areas are within the immediate foreground of

roads, trails, and waterways. Presently, some of the affected views include stands of pine trees in various stages of recovery. Some of these views are dominated by standing dead trees while others display fallen or removed trees.

In foreground views, slash and stumps created by the removal of pine trees may be visible along forest roads and trails. Where prescribed burns have occurred, there would be less down woody debris. In middle ground views, the landscape patterns established by SPB typically reflect the naturalness of the event and blend into the surrounding landscape. SPB has opened up some new vistas along travel ways that were once blocked by living pine stands. Natural pine regeneration is becoming more visible each year. Over time the stand would develop its own visual screening for the landscape.

The mortality of native hemlock trees due to infestations of the Hemlock Woolly Adlegid would continue primarily affecting scenery and recreational uses in riparian areas. Only selected hemlocks are being treated across the Forest to help maintain the species in accordance with the environmental assessment for the "Conservation of Native Hemlock by Suppression of Hemlock Woolly Adelgid Infestations" October 2005.

The No Action Alternative would not result in additional cumulative effects in the analysis area other than those mentioned above.

Alternative B (Proposed Action)

The cumulative effects would be similar to those described for Alternative A. The impacts from planned prescribed burning would mostly occur in areas previously burned limiting effects the same general areas of recreational use. The chances of viewing areas affected by proposed silvicultural treatments would remain limited to areas assigned low or moderate SIOs versus areas those with high or very high SIOs. Visitors traveling in the affected remote areas of the forest would be more likely to encounter these treated stands and view wildlife. Assigned SIOs would be achieved based on the evaluation of cumulative effects.

Existing Condition Cultural Resources

Cultural resources are the non-renewable, physical remains of prehistoric and historical human activities. They are subject to damage or destruction from land disturbing activities, including those associated with vegetation manipulation and road construction. Area disturbance can damage or destroy the historical, cultural, or scientific integrity of historical or prehistoric resources. Disturbance of historical sites, such as old cabins, can reduce the ability to reconstruct the recent history of settlement in the local area. Disturbance of ethnographic sites, such as traditional Native American campsites or burial grounds, can reduce the interpretive significance of the site or can infringe on religious rites.

The current direction on the CNF is to protect significant cultural resources from adverse impacts that may occur as the result of land disturbing activities, and to inventory NFS lands in order to locate and evaluate all cultural resources. This policy is based on adherence to Federal and state laws and regulations. Cultural resources are closely coordinated with the State Historic Preservation Officer (SHPO).

In compliance with executive order 11593, the National Historic Preservation Act, the National Environmental Policy Act, and the USFS regulations (Forest Service Manual 2360), a cultural resource inventory was performed to determine if potentially significant cultural resources would be affected by the project.

Direct and Indirect Effects Cultural Resources

Alternative A (No Action)

This alternative would have no effect on cultural resources. There is limited potential for discovery of currently unknown sites.

Alternative B (Proposed Action)

This alternative would not affect cultural resources as long as site(s) that have potential eligibility for inclusion in the National Register of Historic Places (NRHP) are avoided during project implementation. If additional cultural resources were to be discovered during project implementation, the project would be halted until the resource(s) is/are evaluated

Cumulative Effects Cultural Resources

All Alternatives

There are no known cumulative effects.

Civil Rights

None of the alternatives would have disproportionate adverse health or environmental impacts to minority groups, women, or low-income populations. It is difficult to assess the degree of impact each alternative presents to these groups due to other variables. The best information suggests that when assessing the effects of each alternative on minority and low-income groups, the effects are minimal and not disproportionate to these groups when compared to other groups.

Existing Condition Economics

An analysis of the economic efficiency of the alternatives was conducted in order to provide a reliable means to contrast the relative costs and benefits of the proposed activities. The results of the analysis provide the Responsible Official with the assurance that economic efficiency was considered. It also provides some information about the potential economic impacts of the alternatives.

Cost and unit estimations are derived from field data, maps, and actual prices from similar projects. The economic analysis only looks at stumpage related benefits and the costs involved in preparing and implementing a timber sale. Timber harvesting activities may result in changes, both positive and negative, to other resources such as wildlife or recreation. These changes can have an associated economic value, but they are often difficult to quantify in amount or value, and are therefore not considered in this analysis. However, these items would be considered in the decision making process, along with the economics of the sale.

Direct and Indirect Effects Economics

Alternative A (No Action)

Alternative A does not produce revenues or incur financial costs. There would be no benefits to the local economy with the No Action Alternative.

Alternative B (Proposed Action)

Economic effects are presented in Table 21. This table follows direction given in Forest Service Handbook 2409.18,30 (USDA 1995b). Some calculations that were used to arrive at the values in the table were derived using a computer spreadsheet (Project File).

Table 21. Benefit Cost Ratio

	ALT B
REVENUES	
Timber	$445,872
Recreation	$0
Wildlife	$0
Other	$0
Total Present Value Revenues	$445,872
FINANCIAL COSTS	
Harvest Administration	$32,260
Sale Preparation	$148,396
Analysis and Documentation	$16.130
Other Resource Support	$16.130
Brush Disposal (FS Component)	$0
Road Design & Construction	$74,800
Reforestation	$83,594
KV Other	$0
Silvicultural Exams	$5,124
Stand Improvement	$37,917
Transportation Planning	$500
Total Present Value Financial Costs	$414,851
Present Net Value	$31,021

Cumulative Effects Economics

Alternative A (No Action)

The No Action Alternative does not provide an economically efficient timber harvest.

Alternative B (Proposed Action)

Alternative B has a present net value of $31,021. It should be noted that the current base price for yellow pine is unusually low. Any recovery of yellow pine price would increase the present net value of the sale. Alternative B would produce 6.46 CCF (3.23 MMBF) of forest products. CCF is the notation for "hundred cubic feet" and MBF is the notation for "thousand board feet". Alternative B provides an economically efficient timber harvest, which benefits the local economy, provides jobs, and provides payments to local and federal governments. This timber sale would provide a positive impact on the local economy by providing high quality sawtimber and pulpwood. Alternative B would contribute to RLRMP objectives for providing sawtimber (Objective 19.01) and pulpwood (Objective 19.02).

Physical Factors

Watershed Description

The Greasy Creek analysis area is located about six miles east of Benton, Tennessee in the Blue Ridge Mountains. The analysis area is a portion of the Ocoee River Basin.

The area is partially located in the Southern Metasedimentary Mountain Eco-region and partially in the Southern Sedimentary Ridges Eco-region.

The landform of the area is characterized by steep, dissected mountains and narrow V-shaped valleys. The physical character of the analysis area is greatly influenced by the geology associated with the Blue Ridge Physiographic province. Geology is a mixture of Precambrian-age metamorphic and sedimentary materials such as bouldery colluvium; Precambrian sandstone, siltstone, shale, quartzite, greywacke, arkose, phyllite, slate and schist and Quaternary sandy shaly colluvium, Cambrium shale, sandstone, siltstone, quartzite and conglomerate.

Elevation in the area ranges from about 3,000 feet at Oswald Dome to about 845 feet at the confluence of Greasy Creek with the Ocoee River.

The area has an average annual temperature of 55 degrees Fahrenheit. January is usually the coldest month with an average temperature of 35 degrees Fahrenheit, while July is usually the hottest month with an average temperature of 75 degrees Fahrenheit. The area averages about 55 inches of precipitation annually, which is distributed fairly evenly throughout the year. March is usually the wettest month with an average of 5.9 inches of precipitation, while October is usually the driest with an average of 3.0 inches of precipitation. The length of the growing season is approximately 180 days per year. Prevailing winds in eastern Tennessee are predominantly from the southwest.

Existing Condition Water Resources

Drainages within the analysis area include Greasy Creek, Madden Branch and several, small composite streams. A high percentage (about 77 %) of the analysis area is in public (national forest) ownership, but the mainstem of Greasy Creek and Madden Branch contain significant areas of private ownership, especially within their valleys.

Valley types within this analysis area exhibit moderate relief, are generally stable, and have moderate side slope gradients. The upper reaches of streams can be described as A3 types by the use of the classification system developed by Rosgen (Rosgen 1994). Stream gradients are generally steep in the upper reaches of the watershed (10% +) with low stream sinuosity. Channel materials are predominantly cobble with a mixture of bedrock, boulders, gravel, and sand. Larger streams generally have a decrease in gradient, and stream types change from an A3 to B or C channels. Both of these stream types are generally stable.

Stream flow varies seasonally with rainfall and the effects of evapo-transpiration. Streams within the analysis area have an estimated, average annual discharge of about 2.2 cubic feet/second (cfs) per square mile of watershed. Higher discharges generally occur in the winter and spring months while low flows generally occur in the late summer and fall. Low flows (7Q10) generally range from 0.1 to 0.5 cfs per square mile of watershed.

The water quality of Greasy Creek and tributary streams within the analysis area can generally be characterized as low in conductivity, low in alkalinity, slightly acidic, low in nutrients, and generally free from excessive sediment. Based on empirical evidence, localized sediment input

and deposition into Greasy Creek is a water quality concern. This is considered to be problematic primarily due to private land uses that have and are continuing to occur within much of the valley of Greasy Creek.

The water quality of streams within the analysis area has been found to meet their use classifications. This includes Greasy Creek and its associated tributaries and Madden Branch. Empirical evidence indicates that the existing condition of Greasy Creek could be improved by reducing future sediment yields to the stream. Most of the watershed and sediment sources are located on private land, however. While empirical data indicates that suspended sediment concentrations are generally low in the streams within the analysis area on NFS lands, it can be problematic during periods of intense rainfall. Roads and trails are believed to be the primary source area for sediment from NFS lands.

The Tennessee Eco-region Project has completed an initial effort to establish reference conditions for water quality by eco-region (TDEC 2000). A summary of selected water quality statistics for the Blue Ridge Eco-region represented in the analysis area is displayed in Table 22 below. The data values and statistics shown represent sites within the entire eco-region, and provide a first approximation of reference water quality.

Table 22. Descriptive Statistics of Water Quality Data for Blue Ridge Eco-region

Parameter	Unit	# Observations	Minimum	Maximum	Median	Mean
Temperature	° C	153	1.01	24.72	11.60	11.67
Dissolved Oxygen	Mg/l	152	7.74	16.60	10.06	10.31
Suspended Residue	Mg/l	164	5.00	49.00	5.00	5.51
Dissolved Residue	Mg/l	164	5.00	126.00	22.00	26.96
Turbidity	NTU	163	0.10	15.00	0.90	1.50

While the reference conditions present the best case in terms of water quality, the desired future condition for water quality within the analysis area would be for all waters to achieve their designated use criteria established by the State of Tennessee. Roads, trails, dispersed recreation sites and other areas contributing accelerated erosion and sediment yields would continue to be treated to minimize water quality impacts.

Stream Channel/Riparian Areas/Wetlands

Stream channels in the analysis area are generally in good physical condition. Erosion from the existing road system results in sediment deposition into streams.

A proper functioning condition assessment has not been completed on forest riparian areas. Most riparian areas on NFS lands are believed to be functioning at or near their proper capability and potential. Where roads exist in riparian areas, proper functioning condition could be at-risk or non-functioning. Sufficient quantities of large woody debris, for example, may be absent in some streams due to these facilities and/or past land use practices.

National Wetlands Inventory (NWI) maps identify several small wetland areas within the analysis area. These wetlands are associated with streambed and the associated floodplain of these streams. The wetland types identified include:

- R3RB1H (riverine, upper perennial, rock bottom, bedrock, permanently flooded) area located along reaches of Rock Creek, Clear Creek, Coon Creek, and Greasy Creek.
- PFO1A (palustrine, forested, broad-leaved deciduous, temporarily flooded) areas along reaches of Greasy Creek
- L2UB2Fh (lacustrine, littoral, unconsolidated bottom, sand, semi-permanently flooded, diked/impounded) associated with the lower portions of Greasy Creek.
- L2UB3Fh (lacustrine, littoral, unconsolidated bottom, mud, semi-permanently flooded, diked/impounded) associated with lower portions of Greasy Creek.
- L1OWHh (lacustrine, limnetic, open water, permanently flooded, diked/impounded) associated with the lower portions of Greasy Creek.
- POWHh (palustrine, open water, permanently flooded, diked/impounded) associated with a small pond on the upper section of McCamey Branch, and another close to Fairview Road.
- R4SB2C (Riverine, Intermittent, Stream Bed, Rubble, Seasonally flooded) located along McCamey Branch.
- R3UB1H (Riverine, upper Perennial, unconsolidated Bottom, Cobble-Gravel, Permanently Flooded) located along Greasy Creek.

The wetlands delineated through the NWI are identified primarily through stereoscopic analysis of high altitude aerial photographs based on vegetation, visible hydrology, and geography in accordance with Classification of Wetlands and Deepwater Habitats of the United States (FWS/OBS - 79/31 December 1979). Field evaluation and verification is not conducted during the preparation of these delineations. To identify jurisdictional wetlands subject to Clean Water Act regulations requires field delineation and identification. The wetland areas listed above are presented as a reference and a first approximation of possible wetlands within the affected watersheds. Field delineation would be required prior to conducting any management actions near wetland areas. It is quite likely that other small wetland areas are associated with springs and seeps within the analysis area. If so, these would be identified and protected during project implementation.

Direct and Indirect Effects Water Resources

Alternative A (No Action)

This alternative would result in the continuation of current conditions in the analysis area. Minimal, geologic erosion would continue from undisturbed forest lands. Other than geologic erosion, accelerated erosion would primarily continue from existing roads and trails.

No effects to the water resources in the analysis area would result from new management activities considered in this proposal.

Alternative B (Proposed Action)

Timber Harvesting

Perennial and intermittent streams are close to, adjacent or within stands where harvesting is proposed. Streamside management zones (SMZ) (riparian corridors and filter zones) would be

established around these streams as specified in the RLRMP. Filter zones would be established along scoured ephemeral streams. Temporary roads and skid trails would be located mostly on ridge top and side slope locations, where most of the erosion that does occur would filter out in the undisturbed forest floor before reaching stream channels. Log landings would be constructed outside of stream management zones, generally on ridge top locations.

Mitigation measures that are employed during and after timber harvest activities to reduce erosion and sediment yield potential are an important consideration. Extensive research and effectiveness monitoring have proven the value of properly applied mitigation measures in greatly reducing erosion and sediment yield potential (Patric 1994 and Curtis et al. 1990).

Changes in water yield would occur in response to timber harvest, skid trail development, and silvicultural activities such as mechanical slashdown of vegetation. These activities would increase water yield by decreasing the interception of precipitation by trees and the loss of soil water due to transpiration. Research indicates that achieving a measurable increase in streamflow requires at least a 20% decrease in basal area (Douglas and Swank 1972 and Patric 1994). As basal area reduction increases to 100%, greater increases in streamflow take place. Any basal area left on harvested areas would tend to reduce the water yield increase.

Stream flow increases do not last long in the southeastern U.S. due to the rapid regeneration of dense new stands on cut areas. Although increased yields are possible from 5 to 10 years after harvest, almost all of the increase is over after 5 years for clearcuts and within 1 to 3 years when less than 50% of the basal area is removed (Swank, Vose and Elliot 2001).

Both treatment types would leave reserve areas with no treatment in stands along streams and other areas. This basal area would remain after any site preparation. Table 23 displays the amount of harvest by cutting method in each watershed.

Table 23. Timber Harvest in Watersheds by Cutting Method

Watershed	Watershed Size in Acres (Estimated)	Shelterwood	Seedtree	Clear Cut	% With Harvest Activity
Clear Creek	3,079	83	47	---	4.2
Coon Creek	2,031	---	68	20	4.3
Long Branch*	657	---	25	---	3.8
Greasy Creek*	1,626	---	112	---	6.8
Rock Creek	2,740	---	35	---	2.7

* The watershed acres only include the upper reaches of these drainages.

Timber harvesting increases stormflows in relation to the amount of basal area removed, the number of acres of a given watershed treated, inherent watershed hydrologic response factors (such as soil depth) and the magnitude and frequency of storms following treatment. Research at Coweeta Hydrologic Lab indicates that timber harvest (clearcutting) with minimal forest floor disturbance and a low density of carefully located and designed roads produces only small and acceptable (about 15 %) increases in mean stormflow volumes and peak flow rates (Swank, Swift and Douglas 1988).

The percentage of harvest acres to watershed acres is very low; therefore, little, if any, effect to water yield would occur in these watersheds. Any augmented flows from the streams in the analysis area would merge imperceptibly into Parksville Lake or the Ocoee River. Periodic high flows also act as a flushing mechanism to move sediments downstream through a channel system.

The chemistry of water flowing through forests changes as water passes through the canopy, soil, subsoil and eventually into streams. Forest harvesting reduces interception losses, allowing more water to reach the soil, thereby diluting nutrient concentrations (all else equal). The removal of mature trees would result in a temporary decrease in the demand for nutrients therefore; more nutrients are available and are potentially free to move off site. Nutrients can be dissolved in precipitation and infiltrate into underlying mineral soil. Subsequent drainage through the soil can carry some nutrients such as Nitrogen, Calcium and Magnesium to nearby streams. The duration of this possible effect is generally considered to be less than five years. After this time period, sprouts, seedlings and other vegetative growth reestablish the cut area and effectively tie up available nutrients.

Long term measurements of chemical changes in water quality at Coweeta Hydrologic Lab are summarized as follows:

> Based on observations beginning in 1972, none of the harvested areas or other disturbances at Coweeta produced nutrient concentrations that would have an adverse impact on water quality for municipalities or downstream fisheries.
>
> Compared to other forested regions of the U.S. increases in nutrient concentrations of streams at Coweeta were small, even for the most drastic vegetative disturbances.
>
> Nitrate-N is a sensitive indicator of forest disturbance and although concentrations are quite low (<0.2 mg/1), elevated levels in streams draining clearcuts appear to persist for 20 years after cutting. However the increase is substantially diminished by the fifth year after cutting and appears to approach pre-logging levels (Swank 1988).

Implementation of forest BMP's such as SMZ's would greatly reduce the amount of nutrients reaching the stream. Vegetation within the buffer zone would quickly absorb any available nutrients. Any chemical changes that might occur from the project should be examined in the context of the streams natural or background chemical composition. Streams draining the affected area are low in dissolved solids and fertility. Any small infusion of fertility into these streams that are nutrient poor would have benign or possibly positive effects in terms of aquatic habitat.

Stream temperature would not be affected by the proposed action. SMZ's would be left beside perennial and intermittent streams in any stand affected by timber harvest. These corridors

would provide shade strips where trees would be left uncut and soil disturbance would be kept to a minimum (see mitigation section of this EA).

Available research indicates that pH is not sensitive to most forest management activities. There is no evidence that acid-bearing rock is present in the affected area. If any were to be encountered during project implementation, appropriate steps (project cessation and/or mitigation) would be taken immediately to address the hazard.

Roads

Road surfaces are impervious for the most part and add to permanent water yield increases unless reforested. Surface and subsurface flows are also intercepted by the road when water is moving down adjacent hill slopes. Water can be concentrated either on the road surface or in adjacent ditches, and in places, is rerouted from pathways it would otherwise take if the road were not present. By intercepting surface and subsurface water flow, and diverting it into ditches and channels, roads effectively increase the density of streams on the landscape. As a result, water infiltration decreases, the timing of flood flow is quickened, and the peak of flood flow is increased. Water yield increases are occasionally moderate to high relative to road drainage inputs to small channels on site. Closed roads would be seeded with grasses to prevent erosion and drainage dips installed or substantial water-bars added to reduce impacts of concentrated flow increases in sensitive areas. Frequent drainage structures reduce the amount of concentrated flow that is diverted into forest filter strips at any one point. Drainage structures also divert water flow directly to channels.

Temporary roads constructed on low to moderate slopes away from streams have limited hydrological effects. There would be no long term effects as long as road closures prevent continued use by vehicles, and measures to reduce erosion and control water are in place. Some closed temporary or unclassified roads, transmission lines, wildlife openings and log landings with 4 percent or lower gradient would be disked to maintain quality wildlife food, cover and hunting opportunities with limited risk to water resources. Standards and BMPs address road activities and avoidance or restrictions in road location or practices would be employed when crossing streams or within the riparian corridor. Temporary roads used for harvest operations contribute to erosion and sediment in the short term (up to 3 years), but the effects to soil and water can be mitigated to a great extent with effective erosion control measures.

Road reconstruction and maintenance operations such as blading the road surface and pulling the ditches can lead to increases in soil erosion and increases in sediment production. However, these operations in combination with structural improvements, hardened surfaces, and vegetation establishment would reduce soil erosion and sediment production from these roads over the long term.

Removing and relocating 1.7 miles of NFSR 185 from the riparian corridor would reduce the amount road sediment that is currently entering Clear Creek. Obliterating the old road bed would restore the hydrology within this section of the Clear Creek riparian corridor.

Prescribe Burning

Prescribe burn activities have the potential to increase the solubility of some cations in the forest floor, but would not diminish water quality (Knoepp et. al. 2004). Streamside areas would be minimally impacted by the burns since no harvest would occur in riparian corridors and logging slash would not exist. Fires would be allowed to back down into streamside areas, but typically

do not carry far into these damper areas. Very little vegetation is killed in riparian areas by the low intensity fire. There would be little, if any, change in runoff from the burned areas.

The blading or plowing of firelines around recently regenerated or privately owned areas may be needed in some instances to facilitate the protection from prescribed burning activities. Fireline blading or plowing exposes the mineral soil by removing vegetation, leaf litter and duff. Blading or plowing would increase the exposed area's susceptibility to soil erosion and displacement of nutrients and organic matter offsite. Firelines can recover quickly when they accumulate litter from a forest canopy and/or treated with erosion control measures to control concentrated flow and reduce soil exposure through revegetation efforts. Firelines that are needed for frequent or regular burning cycles are best designed and maintained on the landscape to provide for both long term use and ability to control concentrated flow and erosion by employing relatively permanent drainage dips, reverse grades, out-sloping and lead-off ditches along with reinstalling and maintaining of other erosion control measures when not used.

Herbicide

Chemical treatments would be used to control non-native invasive plants. Specific herbicides that could be used include triclopyr, imazapic, glyphosate, clopyralid, imazapyr, dicamba, hexazinone, and metsulfuron methyl. A variety of ground application methods could be used, but each method would directly apply chemical to the targeted plants.

Triclopyr is not highly mobile in the soil, and is not a leaching problem under normal conditions since it binds to clay and organic matter in the soil. It may leach from sandy soils if rainfall is heavy after application. The herbicide is broken down by soil microorganisms and ultraviolet light, and persists for 30 to 90 days (46 day average) in the soil depending on soil type and weather (Extoxnet 1996). Triclopyr BEE is much more toxic to aquatic species than triclopyr TEA, or triclopyr acid, the projected levels of exposure are much less even for acute scenarios because of the rapid hydrolysis of triclopyr BEE to triclopyr acid, as well as, the lesser runoff of triclopyr BEE because of its lower water solubility and higher affinity for soils (SERA 2003a). Nonetheless, triclopyr BEE is projected to be somewhat more hazardous when used near bodies of water where runoff to open water may occur (SERA 2003a).

JLB Oil is used as an adjuvant with triclopyr formulations (Garlon 4). This is a mineral oil and Limonene or vegetable oil and Limonene mixture used as a carrier. This product has been reviewed according to the EPA hazard categories under section 311 and 312 of SARA Title III, 1986 and does not contain hazardous components that require reporting.

Imazapic is moderately persistent in soils with an average half-life of 120 days and a half-life range of 31 to 233 days depending upon soil characteristics and environmental conditions. There is little lateral movement of imazapic in the soil. Horizontal mobility in the soil is limited to about 6 to 12 inches, although it can leach to depths of 18 inches in sandy soils (Tu 2004). Imazapic is degraded primarily by soil microbial activity. The extent to which imazapic is degraded by sunlight when it is applied to terrestrial plants or soil is believed to be minimal (Tu 2004). It is, however, rapidly degraded by sunlight in aqueous solutions with a half-life of one or two days.

Glyphosate is inactivated when it comes into contact with soil since it is strongly adsorbed onto soil particles. It is readily metabolized by soil bacteria and many species of soil micro-organisms can use glyphosate as a carbon source. Because of its adsorption to soil, glyphosate is not easily leached and is not likely to contaminate ground water. Glyphosate remains unchanged in the soil

for varying lengths of time depending on soil texture, organic matter content and environmental conditions. (SERA 2003b)

Clopyralid should not be applied to areas where soil is permeable such as sandy soils or limestone fractured areas especially where the water table is shallow. Clopyralid is highly soluble in water and does not adsorb to soil particles readily. As a result, clopyralid can leach to ground water if applied to permeable soils overlaying shallow ground water. (SERA 2004a)

Dicamba is water soluble and stable to oxidation and hydrolysis under ambient conditions (NPIC) The herbicide is somewhat susceptible to photolysis in aqueous systems but not on the surface or in soil (NPIC). Dicamba should not be applied to areas where soil is permeable such as sandy soils or limestone fractured areas especially where the water table is shallow. Dicamba is highly soluble in water and does not adsorb to soil particles readily. As a result, Dicamba can leach to ground water if applied to permeable soils overlaying shallow ground water. This herbicide has a half-life from 4-555 days with a typical half-life of 14-28 days in soils. One study shows that Dicamba had a half-life of <7 days in surface waters (NPIC). Microbial degradation is the major degradation route in soil and water (NPIC). This herbicide is not likely to volatize significantly from aquatic systems and it may remain active for 3 to 12 weeks in the soil (NPIC).

Dicamba is moderately persistent in the soil (Extoxnet 1996). The half-life of dicamba in the soil is typically 1 to 4 weeks (Extoxnet 1996). Metabolism by soil micro-organisms is the major pathway for breakdown under most soil conditions. Breakdown tends to be faster with increasing soil moisture and when the soil is slightly acidic. Dicamba does not bind to soil particles and is highly soluble in water. As a result, it is highly mobile in the soil and may leach to groundwater. Dicamba, like any herbicide, may be transported off-site as runoff or through soil percolation. Runoff is negligible in relatively arid environments as well as sandy or loam soils. In clay soils that have the highest runoff potential, of-site loss may reach up to about 3.5 % of the applied amount in regions with very high rainfall rates (SERA 2004).

Hexazinone is of moderate to high persistence in the soil. The herbicide has a half-life ranging from less than 30 days to 180 days. Hexazinone is broken down by soil microbes, and may also break down via photo degradation. The rate of break down under natural conditions depends on many variables including sunlight, rainfall, soil type, and rate of application. Hexazinone is very poorly adsorbed to soil particles; it is highly mobile in most soils. Hexazinone is very soluble in water, slowly degrades, and has the potential to contaminate groundwater. Hexazinone herbicide activity is lost in aquatic systems by photodecomposition, biodegradation, and dilution. (Extoxnet 1996)

Escort XP is the only formulation of metsulfuron-methyl that is currently used by the Forest Service. Application rates are from 0.0125 to 0.15 pounds of metsulfuron-methyl per acre. The higher rates are used for the control of kudzu. The breakdown of metsulfuron-methyl in soils is largely dependant on soil temperature, moisture content, and pH (Extoxnet 1996). The chemical degrades faster under acidic conditions and when soil moisture and temperature is high. Half-life estimates for metsulfuron-methyl in soil range from 14 to 180 days, with an overall average of reported values of 30 days (Extoxnet 1996). Metsulfuron-methyl is stable to photolysis, but breaks down in ultraviolet light. Metsulfuron-methyl, like any herbicide, may be transported off-site as runoff or through soil percolation. Runoff is negligible in relatively arid environments as well as sandy or loam soils. In clay soils that have the highest runoff potential, of-site loss may

reach up to about 60 % of the applied amount in regions with very high rainfall rates (SERA 2004).

In general, herbicides can enter surface waters via three main routes including:

1. Movement or leaching through the soil profile to subsurface water and travel until contact is made with surface systems,
2. Absorption to a soil particle and movement to surface water systems during heavy rains and;
3. Direct contact with surface water during application.

Several factors are important to consider related to the potential for surface or ground water contamination by herbicides.

1. Mitigation such as streamside buffer zones applied during treatment activity would greatly reduce contamination potential. Generally speaking, buffer zones of 50 feet or larger are effective in minimizing pesticide residue contamination of streamflow (Neary 1996).
2. The very small amounts of herbicide used (generally a pint or less per acre) would greatly reduce the chance of any detectable herbicide reaching ground or surface water.
3. The method of herbicide application (generally foliar treatments) would minimize herbicide contact with the soil and eliminate direct application or drift to surface water.
4. Timing the herbicide application to avoid rainfall during and immediately after application reduces the risk of contamination.

The quantity of herbicide to be used, on-site degradation processes, the method of application, the relatively short persistence of the herbicide in the soil, in-stream dilution and degradation, and mitigation measures to be used would result in minimal risk of surface and ground water quality impact. No herbicide would be applied within 30 feet of open water except for selective treatments that use herbicides labeled for aquatic use. This along with careful control over the weather conditions during which the herbicide would be applied would prevent direct contamination of surface water. Many of the herbicide treatments would be applied directly to targeted species and very little herbicide would make ground contact. As a result, infiltration into the soil and movement via soil water (subsurface) would be minimal. The greatest hazard to surface and ground water quality would result from a possible accident during transportation, storage, mixing and disposal of the chemicals.

Cumulative Effects Water Resources

Alternative A (No Action)

The project proposal would not occur on NFS lands, and no changes to cumulative effects in the area defined by the scope of analysis would take place from these activities. However, past, present, and reasonably foreseeable future activities on NFS lands and/or private lands in conjunction with Alternative A may continue to have effects on the water resource. (Reference present, past and reasonably foreseeable projects in the analysis area pages 16-17)

Past vegetation management on federal lands in the area has consisted of timber harvesting and periodic prescribed burning. Effects from these activities should be minimal considering Forest plan standards and guidelines have been followed. When properly implemented, BMPs have been effective at protecting water quality and associated resources (Adams and Hook 1993, Adams 1994 and 1996, and Jones 2000).

The SPB epidemic of the late 1990's and early 2000's reduced the standing stock of southern yellow pine and white pine within the analysis area. This reduction in basal area probably

resulted in minor changes to water yield in the analysis area, but is not likely to have affected water quality since little ground disturbance was associated with the tree mortality.

The loss of hemlock in the Southern Appalachians may also result in hydrologic changes. Evapo-transpiration would decrease with the declining number of mature hemlocks. Four hydrologic consequences are predicted: (1) increased soil moisture, (2) increased discharge, (3) decreased diurnal amplitude of streamflow, and (4) increased width of the variable source area (Ford and Vose 2007).

NFSRs are generally aggregate surfaced and are generally on sideslope and ridgetop locations. The roads are, however, the main source of erosion and sediment yields from NFS lands within this analysis area. Better drainage and additional road hardening with gravel would improve the condition of these roads and reduce road-related erosion.

Alternative A would not result in any new ground disturbance or other effects, but it also would not implement any improvements to roads within the affected watersheds. Road improvements through reconstruction and maintenance would improve the condition of the roads and reduce erosion and road-related sediment that is currently taking place.

Approximately 20% of the Greasy Creek watershed is comprised of private lands. Past and present land use types and activities such as, agricultural crop and animal production, home construction, land clearing, timber harvesting, and the clearing of stream banks has resulted in an increase amount of sediment entering Greasy Creek. Effects of similar activities in the reasonably foreseeable future would continue to occur. The implementation of Alternative A would have no effect on private lands.

Alternative B (Proposed Action)

Cumulative watershed effects that result from past and current conditions in affected watersheds are described in Alternative A. Alternative B would result in additional disturbance within the watersheds from specified road construction and reconstruction, activities associated with timber harvest and fireline construction. Actual ground disturbance on NFS lands would be a very low percentage of any watershed within the analysis area and would be dispersed over the landscape. The disturbances would be effectively mitigated to greatly reduce the amount of erosion and sediment yield that could take place. Temporary increases in water yield would occur, but the spatial distribution of the increases and the relatively small amount of watershed affected would minimize this effect. Herbicide use would occur with this alternative. The herbicide, method of application and mitigation associated with herbicide use would minimize any effect to water quality.

Prescribe burning would create a mosaic type effect where areas of slash would burn severely, but most of the sites would have creeping ground fires and some areas would not burn at all. There would be limited potential to change runoff or water chemistry as a result from the burning since only a small percentage of the areas would burn severely.

Implementation of Alternative B would reduce the amount of sediment entering Greasy Creek due, to the reconstruction and maintenance of roads. No other Forest Service activity that could affect the hydrologic condition of these watersheds is known or planned. Effects to Greasy Creek are likely to continue from private land activities.

Existing Conditions Soils

Diverse parent material along with other factors such as aspect, topography, and climate has resulted in many different soil types forming across the landscape. Upland soils that are well drained and have moderate permeability most frequently occur within the analysis area. However, the depth to bed rock may vary greatly depending on landscape position and past events such as landslides. Seeps and springs commonly occur in many soil types that are found on benches, foot slopes, toe slopes, colluvial fans, and coves. Soils that exhibit anaerobic conditions are associated with the few isolated wetlands found within the analysis area.

Some soil types due to steep slopes and low strength are subject to slippage and slumping. Other soil types within the stand have a severe risk of erosion mainly due to there textures and slope. Slopes range from 3% to 65% with some areas exceeding 65 %. The topography is moderately dissected by drainages and streams.

Soils within the proposed stand boundaries have undergone intensive management in the past and have remained stable and productive. However, the soil types found within the stand boundaries have limitations that should be considered before ground disturbing activities take place. Soil compaction, rutting, displacement and erosion are the key factors that affect soil productivity. The soils found within the proposed stands are slightly too none eroded. The surface textures are silt loam, fine sandy loam, loam, and cobbly sandy loam in texture and have a moist soil consistence that is very friable to friable. These characteristics allow for good root penetration and nutrient uptake. The subsurface textures are loam, sandy clay loam, cobbly sandy clay loam, and cobbly clay loam with a consistence of friable. Common soil series found within stand boundaries include Junaluska, Keener, Lost Cove, and Unicoi.

The most common soil type within the stands proposed for silviculture treatments is the Junaluska soil series. These soils are moderately deep, well drained, and have moderate permeability. They are found on ridges and side slopes. This soil formed from residuum parent material that is affected by soil creep. They are found on slopes typically ranging from 15 to 50 % but may be found on 95 % slopes. Runoff from these soils is very low where undisturbed but may be very rapid where the litter layer has been removed.

Soils of the Keener series are very deep, well drained that formed in loamy colluvium material. These soils can be found on foot slopes, benches, colluvial fans, and coves. Slopes range from 5 to 65 %. Runoff from these soil types increases as slope increases. The soils have moderate permeability in the subsoil and it maybe moderately rapid in the substratum. Seeps and springs are commonly found in these soil types.

The Lostcove series is very similar in characteristics and in landscape location to the Keener series. The Lostcove series may occur on slopes up to 95%. Seeps and springs are also common in these soil types.

Unicoi soil series is shallow and somewhat excessively drained soils. Bedrock may occur between 17 inches and 25 inches. This series can be found on intermediate mountain ridges and side slopes on slopes up to 95 %. Permeability is moderately rapid. Runoff is low or moderate on strong sloping to moderate slopes and medium or high on steep to very steep slopes.

Soil series percentage in the proposed treatment stands are Junaluska (49%), Lostcove-Keener complex (18%), Unicoi (14%), and Keener (13%). Citico, Tusquitee, and Suches soil series are also found in the treatment area but at very low percentages, about (6% combined).

Direct and Indirect Effects Soils

Alternative A (No Action)

There would be no direct or indirect effects to soils because no activities would be implemented. Current rates of soil building and erosion would continue. In general, the area has no severe chronic hill slope erosion problems.

Alternative B (Proposed Action)

Timber Harvesting

Timber harvesting involves various types and intensities of ground disturbing activities that can potentially affect the soil resource. Erosion hazard and steepness of slope are the primary soil concerns that could limit management activities. Soil concerns associated with logging and other connected actions center around rutting, soil compaction, displacement/erosion, soil exposure and nutrient reduction. Soil disturbance and compaction during timber harvest vary depending upon both the type of soil and harvest method (Swank et al. 1989). Timber harvesting can directly affect the physical, chemical, and biological properties of the soil (Swank et. al. 1989). Effects from this action may include immediate changes in soil and/or organic matter displacement, water infiltration rates, and soil compaction.

Loss of organic matter can result in disruption to nutrient recycling in the soil and reduced nutrient availability for trees and other plants. Nutrient removal varies with the intensity of the activities and degree those organic materials that are removed.

Compaction can limit root growth and development in the soil, decreasing tree growth (Swank et. al. 1989) and increase risk for blow down or tree stress. Water infiltration rates may be reduced due to compacted soils. Soil rutting and erosion can reduce soil productivity and result in permanent loss of soil.

Where soil compaction is severe and unmitigated, soil productivity would be reduced due to loss of soil structure. Compaction is most likely to occur on those areas where heavy equipment operates repeatedly, especially when soils are wet. Areas subject to compaction include skid trails, temporary roads, and log landings. While subject to many variables, it is estimated that about 10% of a given area harvested by conventional logging equipment (chainsaws/rubber tired skidders) is impacted by skid trails, temporary roads and log landings.

The potential effects of soil erosion, sediment yield, and compaction have a spatial and temporal context. The amount produced depends upon the topographic, soil, and climatic characteristics of the affected area along with the intensity of management practices being implemented. Erosion that results from timber harvest would be greatly modified through time in that disturbance would be temporary and generally a single pulse over a long period of time. Research has repeatedly shown that sediment production during timber harvest may accelerate temporarily to about 0.05 to 0.50 tons per acre per year (Patric 1976 and 1994). Any given area to be disturbed by regeneration harvest would be cut and site prepared within a year's time. After this, it is unlikely the area would be disturbed (barring natural disturbance) for at least 50 to 60 years.

Indirect effects occur with time such as accelerated weathering of the soil, increased erosion, and accumulation of soil in depressional areas, nutrient leaching and alteration of organic matter formation.

With proper mitigation applied, all effects of timber harvest on soil loss, sediment yield and compaction would return to precutting conditions within 2 to 5 years. If any areas suffer severe compaction, however, the effects of the compaction could last much longer. Impacts to soils would be reduced by following existing RLRMP guidelines (USDA 2004a), and implementing Tennessee BMP's.

Roads

Road maintenance operations such as blading the road surface and pulling the ditches can lead to increases in soil erosion and increases in sediment production.

During road reconstruction activities, soil may be displaced and exposed. Soil movement would occur, however, mitigation measures designed to stabilize the road surface, such as adding aggregate surfacing by armoring the soil or limiting distance and amount of concentrated flow by installing water diversion devices (dips, reverse grades, outslopes, leadoff ditches, culverts) would reduce adverse effects. The detachment and distance soil particles move would be reduced by limiting water concentration and movement on disturbed surfaces and/or fill materials.

Some soil types within the Greasy Creek watershed are better suited for road building. Proper location of roads would reduce effects to the soil resource and reduce the risk of road failure. Following RLRMP guidelines (USDA 2004a) would reduce the effects to the soil resource.

Prescribe Burning

Site preparation burns after harvesting is completed can be of high intensity and severity because of the increased amount of woody fuels present. Care must be taken to avoid burning areas too hot, affecting soil properties, nutrients, and organisms that may lead to loss in soil productivity.

Fire generally affects soil erodibility if mineral soil is exposed. Reports show little to no erosion after light to moderate intensity fires in the southeastern United States (Swift et al. 1993). However, burns with previous soil disturbance such as skidding of logs would increase the probability of soil erosion after burning (Swift et al. 1993).

Effects to the organic layers and soil organisms depend greatly on the penetration into the soil. Heat penetration depends upon duration of heating and soil moisture (Swift et al. 1993).

The types of burning employed by the Forest Service limit the effects to the soil resource by burning under prescription when the duff and humus soil layers can be protected. By burning within strict parameters and lighting ridges and upper slopes, the fire burns dryer sites and extinguish in the moist streamside and bottomland areas. Other than dozer or handline, there would be little, if any, mineral soil exposure resulting from the low intensity burning.

Burning activities (site preparation burns and periodic prescribed burning to meet other resource objectives) normally use existing roads and natural barriers (riparian areas, creeks, streams and rivers) and established firelines. However, existing firelines often need to be re-bladed (remove vegetation prior to burning) or otherwise treated during the burning activities. Most firelines that are reused would have drainage features as dips, lead-outs, or reverse grades at regular intervals to reduce concentrated water flow, erosion, and sediment.

All firelines would be seeded following the burn. Special attention would be used for firelines that connect to streams to avoid entry of storm water or sediments. Forest wide standards (USDA 2004a) would be followed during implementation.

Wildlife Habitat Improvements

For wildlife openings and linear wildlife strips, annual to periodic disking is common on some areas, and not on others. Disking at regular intervals can cause excessive erosion and productivity losses. These adverse effects are at acceptable levels normally by limiting these activities to slopes less than 10%. Additional measures such as no till, contour farming, or leave strips can be used to further reduce soil exposure or concentrated flow that contributes to erosion.

Some of the soils within the proposed stands are not suited for creating ephemeral pools. Effects from the creation of ephemeral pools on flat ground would be minimal. Great care need be taken to avoid unstable soils, fill slopes and other areas that could be hydraulically overloaded, resulting in failure. Direct effects would be the removal of the surface soil horizons, and an increase in water retention within the localized area. There would be some soil displacement from the removed soil. Indirect effects may be an eventual change from aerobic to anaerobic conditions of the soil within the wetland. This would depend on how well the depression holds water.

Herbicides

Chemical release treatments would have minimal effects on the soil resources due, in part, to the application methods. Minimal amounts of chemical would come in contact with the soil as most are targeted for application on the leaf surface or directed into the vegetation. These application methods do not require disturbance to the soil litter or duff layer and therefore, erosion is not a concern.

Many field studies involving microbial activity in soil after Glyphosate exposures note an increase in soil micro-organisms or microbial activity, while other studies have noted a transient decrease in soil fungi, bacteria and microbial activity (SERA 2003b). There is very little information suggesting that Glyphosate would be harmful to soil microorganisms under field conditions and a substantial body of information indicating that Glyphosate is likely to enhance or have no effect on soil microorganisms (SERA 2003b).

There is very little evidence that Dicamba adversely affects soil micro-organisms (SERA 2004) The most useful study of Hexaxinone, in terms of the effects to soil micro-organisms, is that of Chakravarty and Chatarpaul (1990) in which no effects were noted on mixed fungal and bacterial populations after field application rates of up to 7 pounds per acre (SERA 2005). This is substantially higher than the maximum application rate of 4 pounds per acre that would be used in Forest Service programs (SERA 2005).

Limited data is available on the toxicity of metsulfuron-methyl to soil micro-organisms. Studies indicate, however, that most effects on soil micro-organisms appear to be transient and recovery occurs within 9 to 14 days (SERA 2004).

Cumulative Effects Soils

Alternative A (No Action)

Alternative A does not propose any new ground disturbance. Effects to soils generally occur because of ground disturbing activities. Cumulative effects from past and present activities generally result in a localized loss in soil productivity due to compaction, rutting, and/or soil displacement. However, soil erosion may also occur which may contribute to sedimentation. Activities, on NFS lands, that are reasonably foreseeable would be implemented under the standards for protecting soils listed in the RLRMP (USDA 2004a); therefore, cumulative effects

from these actions are minimal. Activities on private lands would be site specific to those lands and no cumulative effects would occur to the soil resource from those actions.

Alternative B (Proposed Action)

Little timber harvesting has occurred over the last 10 years; however, periodic prescribed burns have been implemented in portions of the analysis area. Cumulative impacts on soil conditions relative to compaction, displacement and subsequent erosion from past prescribed burning and connected actions are considered minimal for the majority of areas proposed this time for prescription burning. Soil recovery should be rapid on areas burned during the dormant season.

Impacts on soils resulting from timber harvests normally recovered before a new cycle of harvesting begins, and as a result, cumulative impacts relative to compaction and displacement from successive harvesting operations would be expected to be minimal for the majority of harvested areas. Areas that are repeatedly used for logging decks and skid trails in stands that have frequent entries, have the potential to suffer more continuous periods of decreased soil productivity and decreased water infiltration. Although rehabilitation of these sites decreases the duration of the recovery period for soils and lessens the potential for cumulative degradation of soil conditions, the re-opening and use of these areas during successive harvest operations generally results in some decreased soil quality on these sites. These areas are a small fraction of the analysis area.

Other activities on Federal lands within the proposed treatment areas include a variety of maintenance measures. For roads and rights-of-way, activities are performed to ensure the safety of the public and to prevent degradation of infrastructure and the environment. Road maintenance operations such as blading the road surface and pulling the ditches can lead to increases in soil erosion and increases in sediment production. However, these operations may be combined with structural improvements and improvements to drainage structures which reduce soil erosion and sediment production from the road surfaces over the long term. Disking wildlife openings at regular intervals can cause excessive erosion and productivity loss. Limiting these activities to lesser slopes, vegetating, and fertilizing would keep these adverse effects at acceptable levels. Methods of application and mitigation associated with herbicide use would minimize any effect to the soil resource.

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